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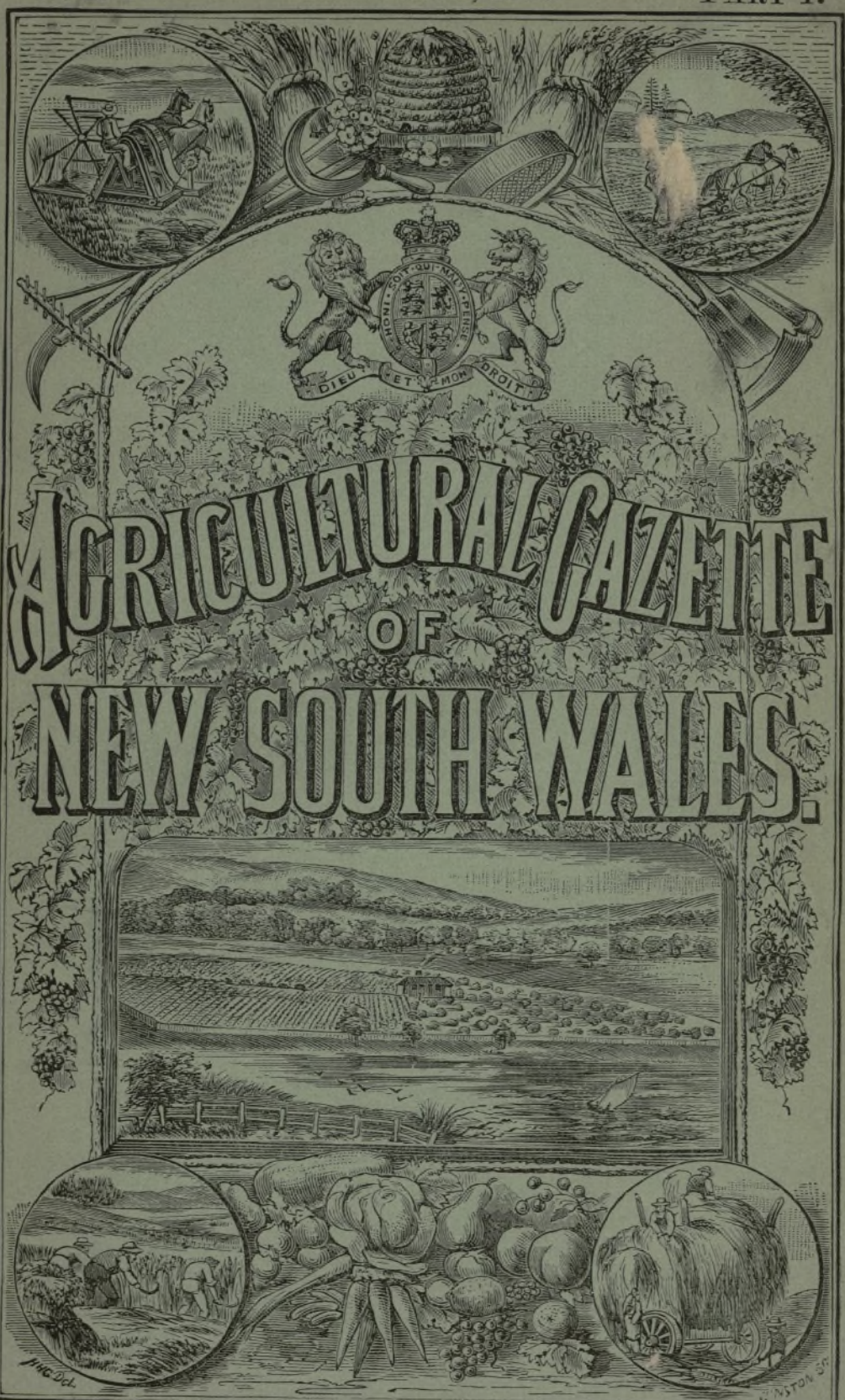


# AGRICULTURAL GAZETTE OF NEW SOUTH WALES.

SYDNEY: CHARLES POTTER, GOVERNMENT PRINTER.

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# THE

# AGRICULTURAL GAZETTE

OF

# NEW SOUTH WALES,

PUBLISHED BY

THE DEPARTMENT OF AGRICULTURE.

VOL. IV. PART 1.

*JANUARY, 1893.*

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# 1893.

IT is with considerable satisfaction that we introduce to our readers the initial part of the Fourth Volume of the *Agricultural Gazette*. During the last three years our efforts have naturally called forth a certain amount of adverse criticism, which has as a general rule been of a friendly character, emanating evidently from a desire to assist the Department in its efforts to a wider dissemination of useful information. Probably the most frequent theme has been that some of the articles were of too scientific a character to be comprehended by the mass of the agriculturists, and, while admitting that this, to a certain extent, has been justified, there is a phase of the question which, apparently, has not occurred to our critics. The *Agricultural Gazette*, while being an organ published mainly for the benefit of agriculturists, is also a means of communication with scientists engaged in investigations in all parts of the civilised world. It places before these gentlemen, in scientific language, intelligible alike to all nations of the earth, the stages which have been reached in similar investigations which are being pursued here, and as these scientists adopt a similar course with regard to their discoveries, the *Gazette* has been the means of preventing a waste of time and energy, and of keeping the Department in touch with the latest discoveries of a scientific nature tending to benefit agriculture. It will be seen, therefore, that any drastic change in the direction of popularity is a matter for very careful consideration. It is claimed, however, that during the year just closed an effort has been made to comply with the desire for popular literature. The scientific articles have been clothed

in the simplest possible language, and while the necessary technical descriptions of insects, fungi, &c., may not have been of interest to all practical agriculturists, the remedies and practical suggestions made as a direct result of the previous scientific examination have always been simple and practical, as many subsequent experimenters have testified. The Department has also endeavoured, by means of numerous illustrations, to bring before the farming community many valuable aids to the more economical working of their farms, orchards, and vineyards.

As the sole desire of the Department, in fact, its reason for existence, is to benefit those settled on the land, we shall be not misunderstood in asking for more energetic co-operation on the part of those we wish to benefit. A column was opened in which it was proposed to publish matter of an interesting character emanating from local Agricultural Societies. It was, and is still, thought that amongst the members of these societies would be farmers who could supply valuable facts on subjects connected with their various industries. It appeared also that at the societies' meetings interesting matter would at times be discussed which might well be reproduced for the benefit of dwellers in other districts. Either the offer of the Department was overlooked, or some diffidence is felt regarding the ability to put on paper the many valuable lessons which cannot fail to be noted by the intelligent agriculturist. The repetition of the offer will assist in again bringing the matter under notice and, with regard to the latter supposition, the Department will be pleased to assist any would-be contributor in properly presenting to readers any facts regarding crops, cultivation, the effect of manures, fungus or insect pests, &c., likely to be of more than local benefit.

We desire to impress upon our readers the importance of keeping in touch with the Department, and by means of

intelligently acting upon hints thrown out in our scientific articles, to aid its officers in their researches, and thus assist in securing the utmost benefit to be obtained from science practically applied. The *Gazette* will always form a convenient channel for conveying to the agriculturists of the Colony notes of experiments made by any individual farmer, with regard to manures, new crops, remedies for insect or fungus diseases, new implements or methods of cultivation, or any other matter of interest to the general farming community.

The various sections into which the *Gazette* is divided have been well filled, and, by way of addition, the somewhat neglected poultry industry has now been added, the first article having appeared in our November issue. Under this head it is intended to give, in addition to the personal experience of the writer, reliable information, from whatever source, regarding the different varieties of fowls, their laying capabilities and value for the table, advice regarding methods of feeding as well as methods for preventing, and remedies for, various diseases. It is intended, moreover, to confine the information given to the purely commercial aspect of the business, and to avoid more than passing reference to those breeds which are of a fancy character.

A series of articles is now being published which will eventually form a complete handbook to the vineyard and cellar; and other branches will follow in due course.

Before concluding, we desire to acknowledge the courtesy of foreign Departments of Agriculture in so readily exchanging publications, and the compliment paid to this Department by most of the principal papers in Australia in republishing articles from the *Agricultural Gazette*. The bulletins which reach us from all parts of the world are of infinite value, and enable us to give our readers the benefit of their latest

discoveries, side by side with the results obtained in this country. To our readers we desire to convey the congratulations of the Department on the excellent season and the satisfactory reports received regarding their crops. The agricultural outlook was never more hopeful.

Co-operative butter factories are springing up in all parts of the country, and the dairying industry is thereby becoming more stable and more remunerative. There are signs of co-operation with regard to the export of fruit whereby it is hoped that the position of the fruit-growers will be much improved. From an article based upon information obtained from America there is every prospect of an increased demand for Australasian wheat in several markets of the Old World, and the general tendency towards adopting a rational system of rotation of crops cannot fail to have a lastingly beneficial effect as well on the land as upon the farmers in increased returns.

In conclusion, we wish our readers a prosperous year, and again express the hope that they will still further extend the co-operative system by appealing to the Department in all their difficulties, informing it of their successes and generally assisting it to become a centre of usefulness, and thus fulfil the expectations of those who initiated and organised the Department of Agriculture of New South Wales.


Panicum leucophœum, H. B. et K.

"Cotton Grass."

# The Grasses of Australia.

(*Continued from Vol. III, page* 949.)

By F. TURNER,
Department of Agriculture.

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## PANICUM LEUCOPHŒUM, *H. B. et K.* "Cotton Grass."

*Flora Austr., Vol. VII, p.* 472.

Stems from a branching base 1 foot to 2 feet high. Leaves narrow, long or short, usually glabrous. Panicle of a few long, slender, and erect, spike-like branches, very unequal, and sometimes reduced to two nearly equal ones, or to a single one, the longest 3 to 4 inches, or in some very lax. Queensland specimens 5 inches long; secondary branches short, slender, erect, the lower ones with four or five sessile or pedicellate spikelets, the upper ones with only one or two; spikelets scarcely 1½ lines long, rather acute, densely covered with long, silky, silvery, or purple hairs, often spreading when in fruit. Outer glume scarcely ¼ line long, obtuse; second and third glumes nearly equal and empty; both densely hairy; the second usually three-nerved; the third five-nerved. Fruiting glume shorter, smooth, rather acute, and often slightly gibbous at the base. Grain enclosed in the hardened fruiting glume and palea, but free from them.

This perennial grass is found in all the Australian colonies from the coast to the arid interior. It appears to be much more abundant, however, in the latter than in the former portion of the continent. According to Mr. Bentham this species is found also in tropical Africa and America. As might be supposed, a grass that is growing under such varied conditions of soil and climate has developed into many forms. It appears to be most variable in the degree of development of its inflorescence. I have received specimens for identification with panicles composed of seven or eight spike-like branches, others with two branches only, and a few secondary short ones; others again with only a simple spike. The latter specimens belong to the variety *monostachyum*, and are found only, as far as I am aware, in the arid interior. Both the typical form and the variety were collected in West Australia by the recent Elder Exploring Expedition. This grass is easily recognised in pastures when in flower by its spikelets being densely covered with long, silky, silvery, or purple hairs, which give it quite an ornamental appearance. It is generally to be found growing on rich chocolate soils in the interior, and in such situations, in a good season, it will often attain 3 feet in height. In all its varied forms it is a valuable pasture grass, and during an ordinary season it will yield a quantity of rich herbage which is much relished by stock of all kinds. I can recommend it for general pasture, or to be grown and turned into hay. I have had this species under experimental cultivation for several consecutive years, and it proved to be a very prolific grass. When cut as the flower stalks first appeared

it made excellent hay, of which horses were very fond. When the grass is allowed to grow undisturbed for a time it produces a great amount of seed which usually ripens in November and December, but occasionally in the autumn months.

*Reference to Plate.*—A, showing the arrangement of the spikelets on the rhachis; B, showing the relative size of the outer glume on the spikelet; C, a spikelet opened out, showing the four glumes and palea; D, grain back and front views, all variously magnified.

## IMPERATA ARUNDINACEA, *Cyr.* "Blady grass."

*Flora Austr., Vol. VII, p. 536.*

A STIFF erect perennial, 1 foot to 3 feet high, glabrous, except sometimes a tuft of hairs at the nodes, which, however, is not so common in Australian as in Indian specimens. Leaves erect, narrow, often longer than the stem; spike-like panicle very dense, 3 to 8 inches long, regularly cylindrical, silvery white, with the long silky hairs concealing the glumes, the dark-coloured stigmas and oblong-linear anthers alone protruding. Spikelets $1\frac{1}{2}$ to near 2 lines long; outer glume five or seven nerved, the second three or five nerved, the third usually empty; terminal flowering glume still smaller; palea usually truncate and jagged at the top; grain small, free, enclosed in the outer glumes.

This perennial grass is found in all the Australian colonies, and also in the temperate and tropical regions of the Old World. It is very common in the coastal districts of this country, but I have not observed it growing very far into the interior. It is generally to be found growing on low-lying rich moist land, though I have occasionaly seen it growing on hill sides. In some instances it covers large areas of undrained land, and if the old stems and leaves are burnt off in October or November, the result will be a capital growth of succulent herbage during the greater part of summer, which cattle eat with avidity. As the stems and leaves become old, however, they are very tough and harsh, and when in that condition are seldom or never eaten if other herbage is obtainable. The blady grass has sometimes proved a valuable stand-by for stock during prolonged droughts, especially after being burnt off in spring time. I have known of an instance where a number of sheep and cattle almost depended upon this species alone for forage for a time during a very dry period. It should be a valuable grass to plant for binding the littoral sands, as its underground stems form a perfect net-work, and are most difficult to eradicate. It can also be recommended for planting on railway embankments, the banks of rivers or dams, or on any loose earth, which it would bind, and prevent injury from heavy rains or flood waters. It should never be encouraged near cultivation, however, for once it became established on good land it would prove almost irrepressible; every small joint of its underground stems that is left in the ground is capable of producing a young plant. When the blady grass is in flower it is easily recognised amongst other herbage by its silvery white spike-like panicles. It produces a fair amount of seed, which usually ripens in the autumn months. It is easily propagated by division of its roots.

*Reference to Plate.*—A, showing the arrangement of the spikelets on the rhachis; B, a spikelet opened out showing the four glumes and palea; C, grain, back and front views, all variously magnified.


Imperata arundinacea, Cyr.

"Blady Grass."


Macadamia ternifolia, F. v. M.

"Australian Nut."

# New Commercial Crops for New South Wales.

*(Continued from Vol. III, page 858.)*

## The Cultivation of the "Australian Nut."
## (*Macadamia ternifolia*, F.v.M.)

By FRED. TURNER.

The "Australian nut," or, as it is frequently called, the "Queensland nut," is a very ornamental evergreen tree.

In its natural state it is mostly found growing on rich alluvial soils bordering rivers or creeks in the coastal districts of southern Queensland, and in the north-eastern portion of New South Wales. Some years ago I saw the tree growing fairly plentifully in Southern Queensland. At that time it was protected on Crown lands by Government regulations, issued to licensed timber-getters. In its native habitat it attains sometimes a height of 50 feet, with a clean, straight trunk for a considerable height. Rarely, however, does it exceed much more than a foot in diameter. When the tree is brought under cultivation, and is allowed plenty of room to grow, not only will the trunk be furnished with branches nearly to the ground, but it will form a beautiful umbrageous head. Its leaves are arranged in whorls of three or four, and are from 5 to 12 inches long, and bordered with sharp teeth, but sometimes they are entire. The small white flowers are arranged in long racemes, and these are succeeded by nearly spherical fruits, varying slightly in size, but often above an inch in diameter. Each fruit contains one smooth, globular, or two half round, nuts, which enclose a remarkably rich edible kernel, of excellent flavour, resembling, but superior to, the filbert. The nuts, however, are very hard, and it requires some force to break them before the edible portion can be got at. It is probably owing to this circumstance that the tree is not so well and widely known amongst cultivators as it ought to be, considered from an economic point of view. It is difficult to understand, however, the reason why such a beautiful evergreen tree has not been more extensively planted in parks and gardens from an ornamental standpoint, for very few native trees surpass it in the distinctive character of its foliage. Although I have assumed that it is probably on account of its hard-shelled nuts that this valuable tree is not more extensively cultivated in Australia, there is no reason why it should remain unknown to many of our cultivators, more especially in view of the number of superior varieties that have been raised from the typical walnut, filbert, almond, &c., and which are now extensively and profitably cultivated in many countries. From these facts it is only reasonable to suppose that if the Australian nut-tree was brought under systematic cultivation, and a careful selection of seeds made from such trees, varieties might be raised from them

that would produce thinner-shelled nuts than those that are borne on the wild trees. Nature has certainly well protected this tree against extermination in its wild state by providing such a hard covering for the nucleus, but this is not the only tree that is similarly protected in a natural state. If nature had not provided such protection to the nucleus of many trees—the fruits of which we now enjoy—they would, in all probability, have been extinct long ago. The natural enemies of many of them are numerous, not to mention periodical forest fires, which would have destroyed the reproductive powers, for the time being, if they had not been well protected.

There should, at least, be one Australian nut tree grown in every garden and orchard, in suitable places, and where frosts do not occur, in the coastal districts of this Colony, from Jervis Bay to the Tweed, both for the sake of its nuts and for its fine ornamental appearance. It is a capital bee plant, and whilst it is in flower I have seen these industrious insects work at it from early morning till dewy eve. It also yields an excellent timber, which, according to Mr. Bailey, is of a red colour, close-grained, firm, and prettily marked, and will doubtless become a favourite wood with the cabinet-makers. Therefore, on this account, it is well worthy of being extensively grown in forests in suitable localities. At one time the nuts of this tree formed a nutritious article of food for the aborigines, of which they are very fond.

## Situation and Soil.

I have seen the Australian nut tree grow best, when under cultivation, in a situation having a north-easterly aspect that was fairly well sheltered from the south-easterly and westerly winds. It seems to adapt itself almost to any kind of soil, provided that it is not too stiff, and is of good depth and naturally well drained. I have seen some very fine specimens that bore abundant crops of nuts, growing in a very light sandy soil, but it was fairly rich in humus. Before the trees are planted the soil should be prepared in a similar way to that for ordinary fruit-trees, and if it is not naturally well drained this should be artificially attended to.

## Propagation.

The easiest and also the most natural way to propagate the Australian nut is by sowing its seeds in the autumn or spring. Having successfully raised from seed many of these trees in different ways, I can recommend the following as being about the simplest plan that can be adopted by any one living in the country. From some light deal wood make as many extemporised boxes as there are nuts to plant. Each box should be 1 foot square and 1 foot deep; in the bottom, bore a few holes to allow the superfluous moisture to escape, then put in 1 inch of rather coarse cinders or charcoal to act as drainage, over this place a few partially decayed leaves, then fill up to within 2 inches of the top with a light, free, open soil, press it firmly down, and on the top of this, but in the centre of the box, plant one of the nuts and cover it with ½ an inch of soil. The boxes should then be set on ashes, which will prevent worms getting into the soil, in a situation where the seedlings will have plenty of light, but at the same time be protected from the fierce rays of the mid-day sun. The seedlings must be watered regularly, but with discretion. On no account should the soil be allowed to become soddened with water, or the young plants will soon present a sickly appearance from which it would take them some time to recover. Under ordinary treatment, the seedlings that are raised in this way will be ready for transplanting to their permanent quarters in about

twelve or eighteen months from the time that the nuts were planted. The nuts might be planted where it is intended the trees are to grow permanently, if the young plants could be regularly attended to with water, and kept free from weeds until they became large enough to take care of themselves. If such a plan were decided upon, each young plant should be protected with a small circle of 1 inch mesh wire.

## Planting.

This is best done in March or September, after rainfall, if possible, or whilst the soil is in a sufficiently moist but easily worked condition. On no account plant out seedlings that have been growing in pots for a long time, and are in that condition generally known as pot bound; that is, those plants, the roots of which have not had sufficient room to expand, and have wound round each other many times. Such plants rarely give satisfaction, and often remain in a stunted condition for years after planting. Choose only the most vigorous and healthy young seedlings for planting out, and good results will follow. If a number of seedlings have been raised for planting in a particular place, they should, at least, be set out 20 feet apart, so as to allow them plenty of room to develop into fine trees. After they have been carefully planted, each one should be tied firmly to a stake to prevent injury from winds until it becomes well established. If dry weather should ensue after the young plants are set out, they should be watered occasionally until fresh root action takes place, which, under ordinary circumstances, will not be long. A light mulch round each young tree would be an advantage, inasmuch as it would keep the soil cool about its roots, and prevent a too rapid evaporation of moisture from the ground. The cultivation that is required will consist in keeping down the weeds, and the soil stirred occasionally round the young plants. The only pruning that is required will consist in keeping a clean stem for a few feet above the ground, and in cutting back exuberant growths, so that the tree will form a shapely head. A grove of Australian nut-trees would form a splendid feature in the landscape. The age at which the tree comes to a bearing state varies, of course, in different situations. Under ordinary treatment, however, it may be reckoned at about seven years. It is a very prolific bearing tree. I have never counted or measured the quantity of nuts, that a single tree will bear in a year, but I have counted the number that are borne on some of the racemes, and they vary from three to fourteen. The nuts will keep for a considerable time after they are ripe, so that in the event of an over-production for local demands they could be shipped to any distance with perfect safety.

*Reference to Plate.*—The drawing was made from a photograph of a tree growing in the Sydney Botanic Gardens; A, portion of a raceme; B, a single flower; C, pistil, showing the hypogynous glands; D, perianth laid open showing the four anthers; E, nut; B, C, and D magnified.

# Supposed Poisonous Plants.

## *(Zieria smithii, Andr.)* "Stinkwood."

At a recent meeting of the Council of Agriculture of Tasmania, one of the members brought under the notice of the Council certain facts connected with the serious mortality amongst cattle which had occurred in the Scotsdale district. It appears that Mr. Archibald Park, M.R.C.V.S., was despatched by the Government to the locality, and in his report he mentions that a shrub, known locally as "stinkwood," was mentioned to him as being considered fatal to cattle if confined to a certain part; but if allowed to graze on land adjoining no harm resulted. A bough shown to Mr. Park he describes as having a very pungent odour—a peculiar astringent taste, but not sufficient to convince him of its poisonous properties. It appears there are no funds provided for carrying out experiments with cattle, by which they are likely to be destroyed, and Mr. Park was unable to induce any of the farmers to risk two or three head, with a view to ascertaining the effect of feeding them with the shrub in question. The symptoms exhibited by animals supposed to be suffering from the weed, described by Mr. Park, as follows:—Breathing heavy, very much puffed under the skin over the ribs and loins, loud thumping to be heard all over the chest, gurgling in both jugular veins indicating swollen condition of the heart, but owing to the loud noise under the skin, the heart sounds could not be made out; temperature, 99 degrees. Mr. Park, not having an animal upon which to hold a *post mortem*, was unable to assign any cause for the disease, but he made arrangements for Dr. Richardson, of Scottsdale, to do so on the first opportunity. This occurred shortly afterwards, when a beast, with others, got into a bed of stinkwood, and died within a few days. The most important result of this *post mortem* was to enable the authorities to assure the farmers that there was no fear of infection. The cause of the disease, however, is still undecided, and one step in connection with this decision has been taken by sending to this Department a specimen of the shrub known as "stinkwood" for identification by the botanist, who reported as follows:—"The botanical name of the stinkwood-tree, a specimen of which was received from Tasmania, is *Zieria smithii, Andr.* Besides Tasmania, this tall shrub or small tree is found in New South Wales, Queensland, and Victoria, and in some places it is very common. So far as I am aware, it has not hitherto been suspected of poisoning cattle in this Colony. According to Dr. Hooker, *Rutaceæ*, under which order *Zieria* is arranged, owe their stimulating properties to a bitter substance—a resinous acrid principle, and especially to a volatile oil, secreted by the glands of the leaves and flowers. The rue (*Ruta graveolens*) a native of the Mediterranean region, and cultivated in all gardens, is remarkable for its strong smell and acrid taste, and its essence, obtained by distillation, is employed as a sudorific, vermifuge, and

emmenagogue. Vinegar of rue was regarded during many centuries as a certain remedy against the plague. The Romans used rue as a condiment, as do the Germans still. *Ruta montana*, which grows in Spain, is so extremely acrid that it produces erysipelas and ulcerous pustules on the skin of those who gather it. *Haplophyllum tuberculatum* is so much less acrid that the Egyptian women bruise its leaves in water, and use it as a hair-wash. The peduncles and flowers of the European Dittany (*Dictamnus albus*) are laden with pedicelled glands, which secrete an abundant volatile oil so copiously that the plant ignites at the approach of a candle; its resinous scented and bitter root is tonic and stimulating. *Peganum Harmala* grows in sandy soil in the Mediterranean region; its smell is repulsive and its taste acrid and bitter; the Turks use its seeds as a condiment, and obtain a red dye from them."

## *Homeria aurantiaca*, Sw.; *H. collina*, Thunb.

A specimen of the weed, which is reported to have caused many fatalities amongst stock, has been forwarded from Echuca, and handed by the Chief Inspector of Stock to the Department of Agriculture for identification.

In his report thereon, Mr. Turner says:—"By the receipt of a more complete specimen of the supposed poisonous plant, I have been enabled to obtain a more complete diagnosis, which, however, fully confirms my previous observations. It is an Iridaceous plant, and is known to scientists as *Homeria aurantiaca*. It is a native of South Africa, but has long been cultivated in Australian gardens, as also has another species, *Homeria collina*. Several exotic Iridaceous plants have escaped from cultivation, and now are apparently wild in some parts of New South Wales (*vide* my list of introduced plants). With regard to the properties of these plants, Dr. Hooker says:—'The tuberous or bulbous rhizomes of *Irideæ* contain a small proportion of a fatty and acrid matter and a large quantity of starch, combined with a peculiar volatile oil, which gives them stimulating properties. Some species lose their acridity by drying or boiling, and their tubers may be used as emolients, or even as food; such are several South African species which are eaten by the Hottentots. The bulbs of *Moræa collina* (syn. *Homeria collina*), of the Cape, are very poisonous, and have the same effect as fungi.'"

# Medicinal Plants.

By T. PHILLIPS-GIBSON,
Department of Agriculture.

"Whiles yet the dew's on ground, gather these flowers,
. . . . "Who has the note of them."

*Cymbeline*, Act I, scene 6.

The cultivation of plants and herbs has always occupied a considerable portion of man's time and attention. Ever since that fatal day when the first man was expelled from the garden planted by the Creator, and condemned to earn his bread by the sweat of his face, it has been necessary to cultivate and propagate the plants used for food, and at the same time to devote some thought to those possessing properties having the power to assuage the ills and troubles entailed upon the human race by that same act of disobedience.

Happily, it has been ordained that the earth should bring forth abundantly the "herb yielding seed," for it is impossible to imagine what the appearance of this world would be without the clothing of plant-life which now covers it. If the powers of vegetation were suddenly suspended, the animals, and finally man, would be deprived of the means of sustenance, and, in a short time, existence would be impossible, life would become extinct, and earth would be a useless cypher in the great scheme of creation, a death-ship on the eternal ocean of space; but, fortunately, such an event is not within the range of probability, and while the earth responds liberally to the efforts of the cultivator, it also produces freely many plants the nature and the uses of which have yet to be determined.

Among some of the most useful of the vegetable productions are those which are applied to medicine, and it is noteworthy that they are of very wide dispersion. While not going so far as some physicians and botanists, who assert that where nature produces diseases she also produces the remedies for them, it may be pointed out that scurvy grass and other plants of a like nature grow in cold climates, where scurvy is epidemic; the hot spices in climates where the stomach is liable to torpor from the heat; and that sarsaparilla and cinchona are natives of South America, where impure blood and fevers are almost conditions of existence in the humid valleys.

A number of native Australasian plants must possess medicinal qualities as yet unknown, except perhaps to the aboriginals, but this can only be determined by careful observation and experiment; in the meanwhile there should be cultivated in these colonies such plants as are of proved medical value, and which, although not indigenous, may be grown successfully. It shall be the object of the short articles which will appear under this heading from time to time to give some particulars of these plants (taking the British Pharmacopœia as the standard) that may be so grown, giving directions for their culture and preparation for the manufacturing druggist, and, where advisable, simple instructions for preparing them, together with the quantities forming a dose for domestic use, as well as such notes on their

history and literature as will make them interesting to the reader, and at the same time instructive to the grower.

It must, however, be remembered that a great number of the plants used in pharmacy are very common in their native countries, in some places being only weeds, and some discrimination must be shown in cultivating them, but Burbridge says, "There are few who fully comprehend the fact that every species is wild in some particular portion of the earth's surface"; and there are few farms where there is not some out-of-the-way spot that may with advantage be devoted to herb-culture, and with increased knowledge of their habits and requirements, with confidence in the value of the product, a trade in crude drugs may be opened up. A large selection of subjects is at the choice of the experimenter who desires to give attention to this, as yet, unopened field of production; and there is no reason why New South Wales should not supply the perfumer with violets, lavender, or rose-water, and the druggist with jalap, aconite, and rhubarb, as well as Europe or America; besides, the labour is usually very light, and may be allotted to the younger members of a family, while, at the same time, it is of great interest to all engaged in the culture, and should lead to an intelligent study of native plants and their qualities. By this means plants at present neglected would become of commercial importance (for research is continually adding new drugs and preparations to those already known), and what are now considered useless weeds may yet become subjects of careful cultivation; therefore,

"Think not nature's scheme sublime,
These humble things might spare;
For science may detect in time
A thousand virtues there."

## Dandelion (*Taraxacum officinale*, Wigg).

This plant is a native of the Northern Hemisphere, extending over Europe, Asia, and America, in a wild state, and is in many places a common weed. It is, however, cultivated in some parts both for medicine and culinary use. It has been introduced and succeeds well in many parts of Australia.

Though it is a plant which must have been well known to the ancients, no distinct reference to it can be traced, either in the classics of Greece or Italy, although a plant mentioned by Theophrastus is thought to be it. The word Taraxacum is usually considered to be of Oriental origin, probably meaning "wild lettuce," and we first meet with it in the works of Arabian physicians, who regarded it as a sort of wild endive. It is thus mentioned by Rhazes in the Tenth and by Avicenna in the Eleventh Century. Some commentators consider it to be one of the bitter herbs eaten with the Passover lamb by the Israelites when leaving Egypt.

Dandelion is also known to botanists as *T. dens-leonis* and *Leontodon taraxacum*. These names have reference to the lion, some thinking that the yellow petals of the flowers have a similarity to the golden teeth of the heraldic lion, and others having the opinion that the edges of the leaves or the whiteness of the root led to the name being bestowed by their bearing a likeness to the lion's teeth. However this may be, the common English name "dandelion" (which occurs in some form or other in all European languages) is but a corruption of the French *dent de lion*. One author points out that the lion, in mythology, is the representative of the sun, and the dandelion is essentially a sun plant, while the appearance of the flower is very suggestive of the ancient pictures of the sun, and at the present day

in Denmark, Germany, and Switzerland the children are in the habit of making a chain of dandelion flowers and dancing in a circle, singing a nursery song in praise of the summer sun. This name, referring to the lion's teeth, has been applied to the plant very early, it being noted as a remedy for liver complaint by Welsh physicians, as *Dant y Llew*, in the Thirteenth Century.

Dandelion is very easily cultivated—indeed, when once established, may become troublesome, and therefore care should be exercised as to the situation in which it is planted. It is not particular as to soil, and any remote corner will do admirably to form the beds. The easiest mode of propagating is by seeds, but the roots may also be divided, and a very little portion will suffice to form a new plant. It is, however, in England, usually self-sown, and Cooke, in "Freaks and Marvels of Plant-Life," page 297, remarks:—"The stalks of the down in the dandelion contract closely together in moist and wet weather—a beautiful provision to secure its dispersion only on a dry day, when it is driven off by every zephyr, and not unoften by the schoolboy, who thus endeavours to resolve his doubts as to the hour:

"Dandelion with globe of down,
The schoolboy's clock in every town,
Which the truant puffs amain,
To conjure lost hours back again."

There are several preparations of dandelion used in medicine, the British Pharmacopœia recognising a decoction, extracts from both the fresh and the dried roots, as well as an extract of the juice in spirit. The decoction is made by boiling 1 oz. of the root in a covered vessel, and, after being strained, the liquid made up to a pint by adding more water; the dose being two to four tablespoonfuls. The extract is more difficult to prepare. It is made as follows:—The fresh root is bruised, and the juice allowed to settle; the liquid is then heated to 212° F., this heat maintained for ten minutes, and the extract afterwards evaporated till it is thick enough to be made into the pills. A good preparation for domestic use is made with 4 oz. of the fresh roots in 1½ pints of water, and boiling down to 1 pint, and then straining. This can be taken one or two tablespoonfuls two or three times daily.—*Cooley's Practical Receipts.*

The value of dandelion as a medicine depends upon the bitter principle—*taraxacin*. It is a mild laxative medicine, acting specially on the liver; it is also used in dropsy, and is given along with purgatives. It is a very useful tonic, and prescribed in biliary disorders and dyspepsia.

The root is considered to be in the best condition for use in early winter, the juice at that period giving a larger and better product than at any other, but some prefer that which is gathered in spring.

When the root is being collected for sale, the plants are taken from the ground entirely, and after being freed from earth are dried in the sun; it is then of a dark-brown or blackish colour, breaking off sharply, the broken part showing a yellowish centre surrounded by a whitish bark; on the outside it is more or less shrivelled, with deep furrows lengthwise.

The roots are long, tapering, and seldom branched, and grow in good soil to the length of a foot or more, with a diameter of from an inch to an inch and a half. When dried they are packed in boxes or bales, the size of the package, of course, depending on the quantity in hand, and it is then ready for sale. A good demand for properly-dried roots, free from earth and any foreign substances, always exists, and considering the little trouble of cultivation and harvesting, the price obtained may almost be looked upon as clear profit.

Dandelion is also used on the Continent of Europe as a salad, both the fresh roots and the leaves being used; for this purpose the plants are grown in drills, and blanched in the same way as celery or sea-kale. When used in this manner they are an agreeable and wholesale addition to the salad, and make a good appetiser. The roots are also used in some parts of England, Germany, and America as a substitute for coffee. A well-known preparation is "dandelion coffee," being a mixture of the roots ground with the genuine coffee-berries. The flowers are also capital for honey, being in this respect great favourites of the bees, several of the bee-keepers who reported on honey-plants in the beginning of last year mentioning them as producing good honey of excellent quality.

This notice may well be closed by remarking that the dandelion has been called the "rustic oracle," in reference to the custom of lovers testing the faithfulness of their sweethearts by blowing the downy seeds, and its habit of expanding its rays with the sunrise and closing up in the evening has earned for it the name of "Shepherd's Clock." Darwin says:

> "Leontodons unfold
> On the swart turf their ray-encircled gold,
> With Sol's expanding beam the flowers unclose,
> And rising Hesper lights them to repose."

## Squill (*Urginea scilla*, Steinh.)

The name squill is applied by gardeners to several species of *Scilla*, but the medicinal squill is the product of *Urginea scilla*, Steinh. (*Scilla maritima* Linn.) It is a native of the countries on the Mediterranean coast, both Europe and Africa, and extends from the sea-level to a height of 3,000 feet. It is very common in the south of France, and occurs also in Spain and Portugal. In the neighbourhood of Genoa the peasants like to see it growing under the fig-trees.

Squills have been used in medicine from a very early period. The ancient Greek physicians prescribed it with vinegar and honey in almost the same manner as it is now used. Epimenides, who lived in the 30th Olympiad, is said to have used it extensively, and it is mentioned by Theophrastus. Pliny, who was acquainted with the two varieties (red and white), says, in his Natural History (Lib. XIX, cap. 30), that Pythagoras wrote a volume on its medicinal virtues; and Dioscorides describes the method of making the vinegar of squills which, as well as the syrup, was known to the ancient Arabian physicians. In Egypt it was consecrated to the god Typhon, and mummies of Egyptian women have been found with a squill in the hand. They also planted it in groves, and hung their houses with it to preserve them from evil spirits. In Arcadia, at the festival of Pan, the statue of that deity was decorated with the flowers and the roots of this plant.

The squill was first cultivated in England, for medicinal purposes, in 1648, in the Oxford botanic garden, and it has since been retained in one or other of the different pharmacopœias of the United Kingdom, until the publication of that known as the British, when it was retained as officinal.

The plant belongs to the natural order of the *Liliaceæ*, and is closely allied to the onion and garlic; there are two varieties recognised, viz., the red and white, the white being considered the better. The part which is used is the root, a large, roundish, ovate bulb, of a white or pale-yellowish colour. The most common, and by far the most simple, method of propagation is by offsets, and few bulbs increase or multiply more rapidly; but it is important, in order to be successful, that the division of the bulbs should be effected

when the plants are quite at rest. They should be lifted when the leaves have died down, and the mass carefully divided, and then replanted as soon as possible. Almost any soil will suit, but they succeed best in a light, rich, sandy soil; they grow well in sandy loam, but still faster and of a larger size in a soil composed of peat or mould and sand. A sheltered and partially-shaded situation is to be preferred, as it will not become dry so soon as a more exposed position. As the bulbs do not stand storing well, in order to commence a plantation it may be necessary to obtain seed, but as the seeds are numerous, one or two plants allowed to flower and perfect their seed will be sufficient for ordinary purposes. The seed should be sown, rather thinly, in a well-prepared seed-bed, or else in pans, and covered with about an inch of fine earth. At the end of the first season's growth the bulblets may be taken up and planted in their permanent position, at distances of 1 to 1½ feet apart. It is now only necessary to keep them clear of weeds for the next two years, when they will be ready for lifting and preparing for sale.

In Europe the bulbs are gathered in the month of August, corresponding with February or March in Australia; and are at once freed from their outer dry scales; they are then cut transversely into slices and dried in the sun. Prepared in this manner, the drug appears in the form of narrow, flattish, almost four-sided curved strips from 1 to 2 inches long by three-eighths of an inch or so wide. They are, when moist, flexible, partly transparent, and of a pale yellowish colour; or, if prepared from the red variety, of a roseate hue. When thoroughly dry they become brittle, and are easily powdered. The dry slices are now packed in convenient-sized boxes, and forwarded to the brokers or agents for sale. The bulk of the drug used in England is obtained from Malta, and is prepared as above; while from some other parts packages are shipped consisting of the whole bulb packed in sand.

Both varieties abound in an acrid juice, and have a very bitter taste. They owe their medicinal value to the principles named *Scillitoxin* and *Scillin*. Squills are used as an emetic in whooping-cough, croup, and chronic pulmonary affections, such as catarrh, asthma, &c., and also as an expectorant. There are seven preparations recognised in the British Pharmacopœia, but with the exception of the vinegar and the syrup, they require careful manipulation, and should not be attempted by any but the trained druggist or dispenser. To make vinegar of squills, 2½ oz. of the sliced root is macerated in one pint of dilute acetic acid or in distilled vinegar for seven days, then strained, and 1½ oz. of proof spirit added to make it keep. If, by the aid of a little heat, 2½ lb. of refined sugar is dissolved in one pint of this vinegar of squills, the preparation is called syrup of squill. (B.P.). This latter is a favourite remedy for children suffering from croup, the dose being a small teaspoonful at intervals until vomiting is brought on, thus removing the phlegm.—(Thompson's "Domestic Medicine.") The vinegar of squill is also mixed with honey in the proportion of one pint to 2 lb. of honey, and is useful for the same purposes, but in smaller doses.

Other species of *Urginea* are *U. altissima*, a native of South Africa, which is closely related, has similar properties, and is used by the settlers of that colony for the same purpose as *U. scilla*, and *U. indica (Scilla indica*, Roxb.), a very widely-diffused plant, occurs in India, Abyssinia, and Nubia, used by the Arabs and Hindoos for similar purposes. Another plant, *Crinum toxicarium*, Roxb., is cultivated in Indian gardens, and has been admitted into the Pharmacopœia of India as an emetic. It has handsome white flowers and fine foliage, growing wild in many parts of both India and Ceylon.

# The Western Districts.

By BRUCE SUTTOR,
Department of Agriculture.

On a recent tour through the Western Districts I first visited the Bathurst Plains, which enjoy exceptional advantages in respect to facilities for agricultural operations, having rich alluvial flats and uplands, the cultivation of which is mainly confined to lucerne and cereals. Many of the wheat crops I saw in September were looking remarkably well, though in some cases, from continuous cropping of wheat, old and exhausted fields were easily discernible, but in a few instances I found farmers desirous of gaining information as to the application of suitable manures. The high cost of freight to this and other western districts remote from the manufacturing centres greatly deters the introduction of artificial manures. Nitrogen being a valuable fertiliser for wheat, the soil may be renovated by growing leguminous crops which contain this essential constituent, such as lucerne, clovers, peas, &c., and ploughing the whole crop into the land. Mr. Warboys, of Spring Hill, has adopted this plan with a small area of peas, with the result that the succeeding crop of wheat had a superior appearance to those surrounding it. Where leguminous crops will grow, this system of enriching the land may be resorted to with great advantage. It is always desirable to grow a rotation of crops, and shallow-rooted crops should be alternated with deeply-rooted ones, and by this means the same ingredients are not being continuously drawn from the same regions of the soil. Exhaustion is thus deferred, the yields are larger, and the crops, having vigorous growth, are better able to resist the attacks of insect and fungoid pests. The variation deprives the insects living on any particular crop of their food, and when that crop is moved they lose their sustenance, and either die or go elsewhere.

In the Orange and surrounding districts farming operations are carried on evidently with a view to profit, and many intelligent farmers are to be found systematically working their holdings to the best advantage. Bare fallowing is largely practised with beneficial results.

The expense and trouble of clearing timber off the land is an obstacle to some of the farmers increasing their area of arable land, though, notwithstanding the cost, it pays to make more land available for the plough, especially where there is no system of manuring. The increased yield per acre from the new land will shortly recoup their outlay, and the old fields may be laid fallow, or sheep may be allowed ts graze on them. The custom of making log-fences of the waste timber from an economic point of view may not in the first instance be objected to, though it is generally recognised that such fences harbour no end of insect pests, to say nothing of reptiles, vermin, and the space they occupy. These unsightly fences are occasionally being replaced by posts and wire and hedges, which latter fence greatly improves the appearance of the farms, and the rotten wood and ashes of the old logs afford good manure. The best kinds of hedges I have seen tried here are the hawthorn and osage-orange, both of which appear to thrive.

In recommending live fences, it may be contended by some that they injure the adjoining crops by exhausting the soil; but the fact is that the shelter they afford fully compensates for their keep.

Wellington, being 848 feet lower than Orange, there is a decided change of climate there. All the corn crops looked much more forward than at the latter place, and so great headway had they made, owing to the exceptionally favourable season, that farmers were apprehensive of their falling before coming to maturity, should adverse weather come meantime. The district is admirably adapted for dairying, and a butter factory of small dimensions is already in existence, with a separator, doing good work, and is, I understand, being profitably conducted, though the milk is said to be of poor quality, which is obvious from the fact of the cows being obliged to suckle their calves, which practice will no doubt be discontinued as the operations become more extensive.

Both climate and soil are well suited for growing fruit-trees and grape-vines, and their cultivation should be encouraged. Mr. B. J. Curston is extensively experimenting in this direction on a recently-acquired piece of land, he having secured a large number of the best varieties of fruit-trees and vines from California, and he entertains the idea of irrigation. Fig-trees do remarkably well, and are very prolific. One gentleman informed me that his fig-trees last year returned a profit of about £3 per tree. Marshmallow grows rank in this district, and it is alleged to injuriously affect horses grazing on it, inasmuch that when the animals are driven fast they readily perspire, stagger, and, in some cases, fall down. This property of the plant is, however, questioned by some authorities, as it is understood that in some parts of America the tall marshmallow (*Malva sylvestris*, Linn.), resembling that which is growing at Wellington, is recommended for silage, and the matter is being investigated with the view of gaining more accurate information.

Dubbo was in a very flooded state when I reached there, and I consequently made my visit a short one. Mr. J. Penzer, of Yarrandale, whom I visited, expressed himself entirely satisfied with his experiment last year in making silage of the variegated thistle, without applying pressure. The method adopted in building a stack of 300 tons was by raising it from day to day with from 15 tons to 20 tons of the green material, the idea being that the weight of one day's carting would be sufficient pressure for the preceding days, and so on. Though it was reckoned that when the stack would be used that at least 2 yards deep on the top would be lost or of no value, it was gratifying to find, when cutting it, there was only 2 feet deep of waste under the corrugated-iron covering, and on the outsides there was a small proportion only of mouldy stuff. The thistles were cut when in bloom, and the silage turned out sweet and first-rate fodder, and was the colour of tobacco. The milch-cows, to which stock it was mainly fed, ate it readily, were said to thrive on it, to increase their supplies of milk, and to prefer the silage to anything else within their reach. A feature of this stack was that it shifted slightly from where it was erected, and a large stream of dark liquor escaped from it. The quality of silage is directly dependent on the material from which it is made; and it must be borne in mind that the process of ensilage will not give higher feeding value to any coarse and innutritious substances that may be employed, though it possibly may make them more palatable to stock.

The variegated thistle contains many valuable food constituents, especially salt. It is easily obtainable, and grows abundantly in many parts, and though it has often been looked upon as a troublesome weed, it may, if

converted into silage, be turned to profitable account, and large quantities might, with very great advantage, be stacked up for times of scarcity. As thistles possess an excessive quantity of juicy matter, it may be advisable, when building a stack, to put alternate layers of straw on it, to absorb the valuable elements which would otherwise be lost, though this system may require additional pressure.

As some of the residents of Cobar are desirous of gaining information as to the suitability of their soil and climate for growing wheat and other agricultural products, I proceeded thither with a view of advising on the subject. There are certainly difficulties to be contended with, and the greatest appears to be the low average rainfall, as seen from the subjoined record:—

| | Rain. | Wet days. | | Rain. | Wet days. |
|---|---|---|---|---|---|
| 1881, May to December... | 9·25 | 26 | 1887, May to December... | 14·94 | 35 |
| 1882 ,, ... | 13·95 | 52 | 1888 ,, ... | 4·36 | 10 |
| 1883 ,, ... | 7·24 | 38 | 1889 ,, ... | 21·17 | 47 |
| 1884 ,, ... | 7·22 | 40 | 1890 ,, ... | 28·43 | 71 |
| 1885 ,, ... | 15·83 | 39 | 1891 ,, ... | 31·48 | 66 |
| 1886 ,, ... | 20·76 | 51 | 1892, to September ... | 6·48 | 26 |

Accompanied by the Rev. P. Power, who takes a lively interest in his district, and who has evidently studied its surroundings, I drove several miles from Cobar, but we mainly confined ourselves to the Reserve, or what is known as the Common, comprising, I understand, 94 square miles. The whole district had a decidedly bare appearance, caused by the prevailing dry weather and the depredations of rabbits, which, however, have now almost disappeared through starvation. I found a few small areas of wheat growing, which, though having a thin and rather stunted appearance, had a remarkably healthy colour. The indifferent manner in which the soil was prepared would, in a great measure, account for the poor growth, as in such dry climates especially good crops can never be expected unless the soil is deeply ploughed and well tilled, whereby the roots are allowed to spread in search of food, and by capillary action the moisture rises and helps to sustain the crop.

Very little cultivation has, as yet, been carried on in the Cobar district. I heard of 17 acres of lucerne having been grown, which in the year 1887 was said to have been cut five times, yielding 4 tons per acre at each cutting, which was the result of 20 lbs. of seed sown per acre. No wheat has been threshed, though what has been grown was estimated to yield 25 bushels per acre. A witness brought up in a farming district in South Australia affirmed that he had never seen a better yielding crop in that colony than Mr. O'Neill's 13 acres of wheat of last year, from which 20 tons of chaff were cut.

The alluvial flats now covered with dense "yarran" scrub are decidedly the best of the land, the soil of which is chocolate-coloured clay loam, about 6 inches to 8 inches deep; the subsoil being clayey gravel. I obtained from Mr. Sydney Walker's Oxted farm, of 640 acres, a sample of soil for analysis, typical of the yarran flat country. Mr. Walker's farm is like an oasis in the desert, and it was pleasing to find there a neatly kept orchard and vegetable garden, where everything then growing looked healthy and free from disease, such as apples, apricots, mulberries, figs, and peach trees, all of which are said to bear well, and the latter remarkably so. It appears to be generally considered that the present nakedness of the land is not wholly due to the want of rain, but also to the rabbit pest. As these rodents apparently have so continuously devoured every vestige of grass on presenting itself, that there can be now but very little seed left to germinate. The extermination of this pest is looked upon as hopeless, and the only means of in any way coping with it is by subdividing holdings into small areas with rabbit-proof fences; the system of making large divisions proves

to be of little or no avail. Notwithstanding the many difficulties in connection with droughts and rabbits, the enterprising residents have still unbounded faith in their district, and a number of the leading men are desirous of forming themselves into a syndicate for the purpose of experimenting with wheat-growing on a somewhat extended scale, and of inducing settlement, and are desirous of acquiring a considerable area to promote the operation. Unfortunately, there is no land in the immediate vicinity of the township at present available, except a special area on the common, the price of which is, I understand, from 30s. to £3 per acre, which is looked upon as too high for such a venture, seeing that the district is so far distant from markets and from any main centre.

From 500 acres to 1,000 acres has been mentioned as the intended area for putting under crop, and advice has been asked as to the probable cost of machinery and plant for working such a farm. Generally speaking, the amount may be estimated at about £1,300, which would include 8 horse-power engine, threshing machine, two reapers and binders, and all other necessary implements, except a steam plough, besides which a manager's house, cottage, barn, stable, and sheds, fencing and gates, tanks, &c., would also be required. As the cost of freight varies it has not been included in the above.

Wheat may undoubtedly be grown by proper cultivation much more successfully than as at present, but the only true test is practical experience, and it may be advisable for those willing to make the trial to first experiment with good cultivation on a small area of from (say) 50 acres to 100 acres, and, at the same time, other agricultural products may be tried. I am inclined to believe that grape-vines, with proper attention, may do well, and the varieties of fruit-trees already proved to thrive should certainly not be neglected. A visit to Messrs. Bragg Bros.' station, near Narramine, amply demonstrates what good farming will do for wheat crops in that district. Some 300 acres are under crop, which looks splendid, and at present gives promise of an abundant return. An experimental wheat crop is specially well prepared, and has a healthy appearance, as also a small plot of malting barley, which latter can be recommended as an alternative crop with wheat.

Messrs. Bragg wisely took the precaution of making their boundary fence rabbit-proof before that pest made its appearance.

Farming operations to be successful cannot now be carried on in the same perfunctory manner as in former times, when there was less competition and transit was more difficult, and it is gratifying to find in some instances farmers are now becoming more desirous of first hearing what science has to say about agriculture. A farmer must of necessity know the nature of his soils and the agencies required for replenishing them—he should allow himself sometime for study and for a proper system of book-keeping to show the state of his affairs. Inadequate labour on a farm is false economy, as in consequence nothing is done in season. Crops are not sown at the proper time, plants requiring any special attention are neglected, pests are allowed to run rife throughout the orchard. The house is unprovided with vegetables, fences are not kept in repair, the stock break into the crops, the cows have to be milked, and many other such minor matters occupy the attention of the already overworked proprietor. A sudden rise in the price of stock or produce cannot be taken advantage of, and the main chance is lost. The whole business of the farm thus goes on from year to year in an unsatisfactory and muddled state. Those farmers feeling themselves behind the times would do well to look over the fences of their more enlightened neighbours.

Rainfall, Cobar.

| | 1881. | | 1882. | | 1883. | | 1884. | | 1885. | | 1886. | | 1887. | | 1888. | | 1889. | | 1890. | | 1891. | | 1892. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January ... ... ... | ... | ... | 1 | ·10 | 2 | ·36 | ... | ... | 9 | 5·30 | 3 | 2·06 | 2 | 1·35 | 1 | ·26 | 2 | ·80 | 6 | 3·34 | 7 | 9·43 | 1 | ·05 |
| February ... .. .. | ... | ... | 4 | ·83 | 4 | ·84 | 4 | ·36 | 4 | ·98 | ... | ... | 5 | 2·37 | 2 | ·55 | 1 | 1·47 | 9 | 6·71 | 1 | ·98 | 2 | ·52 |
| March ... ... ... | ... | ... | 1 | ·58 | 3 | ·27 | 2 | ·18 | 1 | 1·40 | ... | ... | 7 | 2·71 | ... | ... | 1 | ·18 | 7 | 3·30 | 7 | 2·02 | 2 | 1·00 |
| April ... ... ... | ... | ... | 4 | 1·28 | 2 | ·32 | 3 | ·49 | 1 | ·95 | 2 | ·50 | 1 | 1·92 | ... | ... | 5 | 5·90 | 6 | 2·47 | 4 | 3·39 | ... | ... |
| May... ... ... .. | 5 | 2·40 | 5 | 1·98 | 7 | 1·82 | 5 | 1·02 | 4 | ·66 | 5 | 2·67 | 1 | ·20 | 2 | 2·08 | 2 | 1·34 | 8 | 2·14 | 3 | 2·57 | 5 | 1·52 |
| June ... ... ... | 6 | ·81 | 7 | ·97 | 3 | ·36 | 4 | 1·81 | 4 | ·92 | 1 | ·25 | 4 | ·53 | ... | ... | 5 | 2·81 | 9 | 3·01 | 12 | 1·82 | 3 | ·59 |
| July... ... ... ... | 1 | ·03 | 4 | ·22 | 2 | ·01 | 1 | ·43 | 1 | ·10 | 11 | 2·48 | 4 | 1·23 | ... | ... | 3 | ·31 | 5 | 1·82 | 5 | ·94 | 3 | 1·09 |
| August ... ... ... | 3 | ·47 | 9 | 1·72 | 5 | ·59 | 2 | ·26 | 2 | ·31 | 11 | 4·50 | 4 | 2·33 | ... | ... | 10 | 1·85 | 5 | 1·05 | 10 | 3·18 | 4 | ·47 |
| September ... ... ... | 2 | 1·30 | 1 | ·07 | 1 | ·02 | 7 | ·99 | 1 | ·42 | 3 | ·48 | ... | ... | ... | ... | 4 | ·62 | 6 | 2·28 | 6 | 1·34 | 6 | 1·24 |
| October ... ... ... | 2 | ·63 | 10 | 3·29 | 4 | 2·06 | 6 | ·53 | 2 | ·26 | 4 | 1·39 | 1 | ·15 | ... | ... | 7 | 1·89 | 2 | ·76 | 3 | 1·00 | ... | ... |
| November ... ... ... | 5 | 3·62 | 4 | 1·94 | 4 | ·51 | 5 | ·82 | 2 | ·19 | 5 | 1·71 | 1 | ·55 | 1 | ·18 | 5 | 2·54 | 5 | 1·18 | 3 | 2·29 | ... | ... |
| December ... ... .. | 2 | ·19 | 3 | ·97 | 1 | ·05 | 1 | ·33 | 5 | 3·19 | 6 | 4·72 | 5 | 1·81 | 4 | 1·29 | 2 | 1·46 | 3 | ·37 | 5 | 2·62 | ... | ... |
| | 26 | 9·25 | 53 | 13·95 | 38 | 7·24 | 40 | 7·22 | 39 | 15·83 | 51 | 20·76 | 35 | 14·94 | 10 | 4·36 | 47 | 21·17 | 71 | 28·43 | 66 | 31·48 | ... | ... |

# Clearing Land in the Western and Southern Plains Districts by the aid of a Team of Bullocks.

THE usual and best method of treating forest land intended for cultivation in these districts is to ringbark the timber about ten years previous to clearing. This process tends to aerate and sweeten the soil, thereby increasing its productiveness.

Another great advantage, if time is not a desideratum, is in the cost of clearing, which amounts to about the same for 5 or 6 acres of dead timber as for 1 acre of green timber. The dead tress require very little if any opening round the roots previous to being pulled down, especially if the work is done in winter when the land is moist. The dead trees burn easily, there are no tops to cut, and few roots within the reach of the plough to be removed.

There is the disadvantage, however, that the fencing timber is destroyed, but in many districts there are still reasonable facilities for obtaining fencing materials.

In commencing operations, if green timber is to be cleared from the land, mark a straight strip, 1 chain wide, through the site to be cleared. Open out the soil halfway round the trees, and about 3½ to 4 feet away from the trunk (a greater distance if the timber is very large), and of sufficient depth to enable all the exposed roots to be cut, working well under the stump to allow the tap-root to be cut through.

The excavations to be made from side to side of the marked strip of land, so that the trees when hauled down will fall lengthwise with the strip.

When this is completed, repeat the operation on another strip of land of equal width to No. 1, taking care this time to make the excavations on the opposite side of the trees, and so on through the whole block to be cleared.

In digging out the soil, the top spit requires to be placed back about 3 feet from the outside of the opening, the second spit next to it inside, and the under soil on the top of these. When filling in the holes, the under soil goes back first, and the top or the best soil is replaced on the surface again. If the subsoil were allowed in the refilling of holes to take the place of the surface soil it would take a long time to sweeten and become productive.

When the trees are pulled over, the uncut roots at the back are generally brought completely out of the soil, or, if not quite exposed, the soil is disturbed and indicates where the roots require removing from the reach of the plough before the cultivation commences. Another advantage is that the butts of the trees when felled are lodged over the holes, and the earth sticking in the roots can easily be picked out and falls into the cavity below it, thereby saving the labour of having, as by other methods, to move that portion of the soil twice.

## Tackle required.

1. A 2-inch best steel wire rope, from 90 to 100 feet in length, with a swivel, three links, and a hook attached on each end of the rope, made very stout and strong, to be able to bear a good strain.

2. A close-linked stout chain of suitable length for a sling provided with a strong ring in each end link; one ring small enough to pass through the other. A straight barrel of a tree, about equal to the drawing power of two pairs of bullocks, provided with strong chains round the butt ends, one to hook to the bullock team, and the other to hook on to the wire rope, which is in turn hooked with the sling placed round the standing tree.

3. A light, strong ladder of about 20 feet, to carry the sling up to the required height, completes the outfit.

## Pulling down the Trees.

A team of six to eight pairs of bullocks—heavy, strong beasts—are required, according to the size of the trees to be felled.

In commencing operations carry up the chain-sling, and place it round the tree stem, passing the small ring through the large one, and haul up tight. Hook one end of the wire rope into the small ring on the sling, and the other end to the log previously mentioned, to which the bullocks are attached. The higher up the tree the sling is placed the greater the leverage and the easier the tree comes down.

Start the team pulling at right angles to the openings in the ground. When the bullocks pull, the log is slung up from the ground, and keeps the standing tree from springing back into its original position if a second pull is required to bring it down, which is a very great advantage with heavy trees of sound growing timber and strong roots. By these methods the heaviest and largest trees of these districts come down without much trouble. Ordinary ones of from 24 to 30 inches in diameter usually fall at the first pull.

When the tree is falling, stop the team at once, or the hook in the wire rope will be drawn tight into the ring of the sling, and there will be difficulty in releasing it.

I would here mention that, in pulling down dead trees, the log may be dispensed with if the wire rope is of sufficient length to prevent the hindermost pair of bullocks from choking down by being lifted from the ground when the team is pulling.

Take in turn the trees to the left hand and to the right hand, driving the team up the centre until the end of the strip is reached, then turn the team and pull down the trees in the opposite direction on the next strip of prepared land. By this method unnecessary turning is avoided, which is an item if a team of eight or more pairs of oxen are used.

## Stump Extraction.

Dead stumps require opening up in the same manner as trees. Green stumps require opening all the way round, as they are firmer in the ground, and only a small leverage is obtainable.

Place a strong chain round the stump, as near to the top as possible without allowing it to slip, pass it through the large ring and over the top of the stump. By this method you obtain all the leverage possible.

Hook the team as close to the stump as possible, giving them more lifting power, and the stumps are generally dislodged first pull.

# The Sereh Cane Disease.*

By Dr. G. KOTTMAN,
Inspecting Chemist of the Colonial Sugar Refining Company.

The disease of the cane called sereh is known to have existed in Java for only a few years. It is said by some that it was first discovered in 1879 in the Cheribon district in Western Java, while others contend that it was recognised as a well defined disease only in 1883 in the same district. Possibly its real origin has to be dated back further even than 1879, as it is a disease which in its first stages does not develop any very marked outward signs, and so may have only had attention drawn to its existence when it had taken hold of the cane to such an extent that the crops fell off considerably.

The outward signs of the sereh are side-shoots springing from the cane, and a tendency to the formation of roots on the stalk, and also to the development of more leaf than stalk. The latter is the most characteristic of all signs. When the cane gets very badly diseased the leaves are set much closer together than is the case with sound cane, and in the last stage of the disease the cane forms almost nothing but leaves and no stalk; the stool then has much the appearance of a herbage known in Java as *Sereh*. Thus the disease got its name. Other characteristics are red streaks in the interior of the cane on being split open, the cane becoming rapidly over-ripe, and the dry leaves being more brittle than those of sound cane. When the sereh has fairly got hold of the cane the crops fall off considerably, and the ratoons, as well as the field planted with diseased cane, show, as a rule, a still more serious decrease in the yield.

It is not at all an easy matter to decide in the early stages as to whether cane is attacked by sereh or not. The disease begins to show itself by outward indications only after the cane is well over ground. But even then stalks infected with the disease may attain nearly normal development.

In order to illustrate the difficulties in the way of discerning sound and diseased cane, I may mention that Mr. Kobus, the botanist of the Eastern Java trial station, who has repeatedly travelled over the sugar districts of Java under special instructions to collect information on the disease, and who should therefore be well acquainted with its outward signs, says in the July number, 1890, of the Java agricultural paper *De Landbouwer* :—"With our want of knowledge as to the nature of the sereh, and of distinct outward signs of the disease, it was sometimes difficult to say if a plant was attacked by sereh or not." Dr. Benecke, the head of the trial station of Middle Java, in the November number, 1890, of the same paper, is reported to have said, when asked about the cane obtained in a certain experiment, that he would

* In consenting to the republication of this article Dr. Kottmann expresses the decided opinion that the disorders showing amongst cane on the Northern rivers are not "sereh."

not give an opinion on the question as to whether the cane was healthy or diseased, as neither the cause nor the symptoms of the sereh are yet known

I may remark that if a cane develops some of the exterior indications of the first stages of the sereh disease, as, for instance, the growth of many side shoots or red streaks in the cane, it is not proved thereby that the cane is attacked by the sereh, as cane interfered with in its development in different ways may show the same signs. If, however, cane were to develop many side shoots and closely set leaves at the expense of the formation of stalk, and some of the stools were to assume the appearance of bushes of pampas grass, and if also the plants taken from such cane, as well as the ratoons grown therefrom, were to exhibit signs of the disease in a still more pronounced manner, it might be said with some reason that the cane was attacked by sereh or a disease very similar to it.

The following observations may contribute to our acquiring some understanding of the nature of the disease :—Cane afflicted with sereh is especially found close to the irrigation ditches. The Cheribon district, where the disease was first discovered, consists largely of low-lying land. Fields on elevated land have been found to be less subject to disease than low-lying fields under otherwise similar conditions. The treatment of the soil with lime seems to favour the disease, while the application of acid bodies—acid fermented molasses, acid manures, &c.,—seems to check it. These observations, however, require corroboration. Late planting towards the end of the dry season seems to favour the disease; early planting not long after the beginning of the dry season appears to retard its progress. Cuttings taken from the very top of the cane give much less diseased cane than do those from the main stalk. The weakest stools exhibit the signs of disease first. Cane much attacked by borers or other insects is rendered more liable to disease than cane not so afflicted. Cane sick with sereh is much more attacked by parasites than sound cane. It is believed by many that the germs of disease are carried by the air.

There is nearly unanimity of opinion with regard to the infectious character of the disease. Not only experiments, but also the way in which the disease has spread, support this opinion. From the western district of Cheribon the disease has slowly advanced with almost wave-like front towards the east; and whereas in 1888 only Western and Middle Java were infected, the canefields of also Eastern Java are now attacked. The damage done by the sereh in some parts is very great. Districts have been known where the sereh has reduced the crop by 30 per cent., which means a much greater loss for those mills which suffered chiefly. It is reported that in some cases even only 25 per cent. of the ordinary crop was obtained from sereh-infected fields.

That the Java planters have been very eager in their endeavours to find a remedy against the sereh is easily understood. But so far they have not been very successful. A few years ago great hopes were set upon the introduction of new varieties from other countries, especially as regards a certain variety found in Borneo, and fabulous sums were spent for the purpose. The Borneo cane at first showed very vigorous growth, but in the 1890 season it suffered in many places, even more than the old varieties. It is said in explanation that the commencement of the wet season was unusually dry for that year's cane, and that the Borneo cane is very sensitive to want of moisture. This would support the theory of the disease being favoured by conditions of weakening influence on the growth. Nevertheless, the belief in new varieties from other countries seems to be yet very strong, as it was reported quite lately that it was intended to procure a large supply of plants from India.

Amongst the other remedies for the sereh which have been tried with more or less partial success are the disinfection of the fields with sulphate of iron, sulphate of copper, or naphthaline; the heating of the land with fermented molasses, which had been allowed to get sour; the steeping of the cuttings after spliting and drying in thin solutions of carbolic acid, sulphate of copper, chloride of mercury, and other disinfecting agents; also, last but not least, the application of artificial and organic manures—stable manure, compost, &c.—with or without a thorough improvement of the cultivation all round. The disinfection of the fields with sulphate of iron and copper sulphate has resulted in considerable success in some cases, and the steeping of the cuttings is also reported on favourably by some, though disparagingly by others, but it seems that none of these means come up to artificial manuring, combined with improved cultivation all round. In fact, the opinion already alluded to seems now to gain ground that the sereh is favoured by influences which are adverse to a healthy development of the cane, and that provided the cane is planted in well prepared soil, carefully treated, and well manured with artificial and organic manures, and that the importance of a wise change of plants is not forgotten, the disease may be held at bay.

Dr. Trenbuer, the director of the renowned botanical gardens of Buitenzorg, and Dr. Ostermann, a cane planter of Middle Java, have, from plants obtained from much diseased cane, got cane which was sound to all appearances, and of vigorous growth. In Dr. Ostermann's case the explanation is added that first-class soil was chosen for the experiment, and that the soil was turned over by the spade to a great depth, liberally manured with stable manure, and well cultivated. From one of the cuttings of badly diseased cane he obtained in this experiment twelve stalks, weighing 59 lb.

That Mr. Lucas, planter, of Tegal, reports a diminution for 1890 of the damages done by sereh in his district is also a very important statement, and perhaps stands in some relation to improved cultivation.

It may sound paradoxical to any one who knows of cane cultivation in Australia and in Java to speak in these colonies of the importance of improvements in the cultivation of the latter country. The care taken there in the canefields is extreme as compared with the care bestowed on the cane in Australia. The laying-out of the fields, the selection of the plants, the planting and the weeding, are all carried out to perfection, and no cane is grown without irrigation, and scarcely any without some manuring. Yet there are still great defects in the cultivation. The fields are planted with cane immediately after the preceding crop is taken off. The crop, in most cases, is flood rice, for the cultivation of which the fields are for a long time under water. The easy means of getting water for irrigation may also often be the reason for using an excess of it during the cultivation of the cane. The land is prepared by the plough only in exceptional cases, and as a rule not more than part of it, say about a half or less of the whole area, is turned over by the spade, with the Reynoso system in vogue, though the working of the soil is done to a great depth in the plant furrows. The soil is systematically impoverished in organic matter, as night-soil or stable manure is seldom used, and the trash is burnt in the mill.

What may be the exact nature of the disease is a mystery yet, though this question has been the subject of study for a number of years by a great number of scientific men resident in Java, and partly engaged by the sugar manufacturers for that special purpose.

Dr. Kruger, who for several years held the position of head of the trial station of Western Java, is confident that the disease is caused by bacteria which have not yet been discovered.

Dr. Soltwedel, the head of the trial station of Middle Java, now deceased, had the firm belief that similar parasites to those causing disease in the beet, and living upon the roots of the cane, are the cause of the sereh. These parasites are called nematodes.

It seems that both these theories have a good many partisans. It is contended by the followers of Dr. Kruger that though nematodes have been found in the roots of diseased cane, and in the soil of infected fields, they can only be considered secondary symptoms consequent upon other primary causes. On the other hand, it has been found in several experiments, especially in those carried out by Mr. Poel, manager of Kali Woengoe, near Kendal, that the disinfection of the soil of infected fields is followed by fair success. This may support the nematode theory. Mr. Kobus, whose name has already been mentioned, reports also to have seen experiments which point to an infection of the roots as being the cause of the sereh.

Mr. Van der Wiel, head chemist of a large sugar manufacturing firm of Eastern Java, believes that the disease is a consequence of the propagation of the cane by cuttings instead of seed (*Landbouwer*, June, 1890). This theory does not stand on the same lines with the two mentioned above, as it does not give an explanation of the character of the disease, but refers only to the way in which the disease may have been brought about. If the propagation by cuttings has really been the cause of the disease it may have favoured bacteria, or nematodes, or some other agent, which then became the immediate cause of the disease.—*The Queenslander.*

# "Arrowing" and its relation to the present Disorder in the Sugar-cane.*

By E. de P. O'KELLY,
Department of Agriculture.

In order that the subject of my paper may be better understood, and rendered clear to you, it is requisite that I should refer briefly to the peculiar organisation of the cane plant, its structure and development.

Most of you are aware that the propagation of the cane plant is effected by cuttings, or "sets" taken from the cane itself. These cuttings are taken usually from the upper joints, commonly called the "cane-top," though sometimes the entire stalk is cut up in pieces and planted out, as every part possessing a healthy bud will develop into a plant. Each joint is furnished with one bud, and the "sets" consist of two or more joints. On being planted the joints shoot forth, and at the same time roots issue from the development of the sap-vessels, which are arranged around the whole circle of each joint. These are called radical points, and serve to supply the young plants with moisture and nourishment till they are strong enough to throw out roots of their own. I wish to draw your attention especially to this function on the part of the parent "set," as I shall refer to it later on in dealing with the present disorder in the cane on the Lower River. The roots that emanate from the radical points on the joints of the cane "set" supply the young shoots with sap, consisting of a watery solution of earthy salts, until such period as the shoots acquire perfect roots of their own, when the parent "set," having completed its functions, decays and dies.

Should anything happen to deprive the cane "sets" of these roots, the young shoots will grow for a short time, and then gradually die out, thus showing that the contents of the cane "set," which consist principally of albumenoids, sugar, and mucilage, are not sufficient for the healthy nourishment of the young shoots, and that they require roots to supply them with that nourishment they derive from the soil.

Passing over the early development of the cane, we arrive at the period when it begins to make joints, the first joint requiring four or five months for its entire growth. Attached to each joint of the plant is a leaf, which serves as a reservoir of reserve materials in connection not only with the bud it envelops, but also the development of its own particular joint, so that if this leaf is removed, or any injury occurs to it before it has completed its functions, both the bud and joint suffer accordingly, and the latter is never fully developed.

* Paper read before the Clarence P. and A. Association.

I now pass on to that important event in the life of the cane, called "arrowing," which natural phenomenon takes place when the period of ripening is reached, and stoppage of growth has occurred.

This development on the part of the cane, which has become so widespread on this river during recent years, is now regarded by the farmers as a calamity, inasmuch as it has led to a disorder which may be regarded almost as a specific disease, viz., "checked arrow." As I shall deal with this question of "checked arrowing" later on, I will draw your attention briefly to the question of "arrowing" in the cane.

What is arrowing? Why has it developed only within recent years? Can it be prevented?

These are questions which will naturally suggest themselves to those interested in the cane industry on this river.

"Arrowing" is the natural development of the cane, when it has arrived at that stage that it has completed its growth, and following the usual course to which most plants are subjected, it endeavours to reproduce its species. At this time the joints that spring forth are without buds, and the sap-vessels with which they were supplied, pass into the leaves. The terminal bud or point of vegetation develops into a thin joint 4 or 5 feet long called the arrow, and this is terminated by a panicle of feathery flowers about 20 inches long, commonly called the tassel. This "tassel" or flower was supposed, until very recently, to produce no true seed, but this has lately been proved a fallacy. The cane having completed the development of arrowing, will gradually decay and die out, this process of decay extending generally over a period of six months and even more.

In order to answer the second question satisfactorily it will be necessary to explain that so long as the soil is rich in plant food, and the temperature and moisture sufficient, without being excessive, the point of vegetation or terminal bud is being supplied with all the food and moisture it demands; hence no stoppage of growth occurs, and instead of "arrowing" the cane increases in length and forms new leaves. The dangerous period of cold and dry weather is, therefore, passed, the rainy season comes round, and the cane will attain its maximum development without stoppage of growth, which determines the ripening or "arrowing" period.

In the early days of cane planting the natural fertility of the exceptionally rich soil on this river supplied the cane with abundance of plant food, and thus enabled the terminal bud to continue growth; but now that the soil is impoverished by continuous cropping, the cane is starved out through not receiving proper nourishment from the soil, the growth stops, and the consequence is premature "arrowing."

Can "arrowing" be prevented?

No; it cannot be prevented, as it is a natural development, but it can be delayed by careful and intense cultivation. By satisfying the demands of the terminal bud with food and moisture its premature transformation into the "arrow" can be retarded. This can only be done by restoring your soil to its former productiveness. By this means a proper supply of food materials is ensured to the plant and the activity of the terminal bud or point of vegetation is kept up.

The fixed impression amongst the generality of the farmers regarding the present disorder in the cane is that it is a "blight," caused by atmospheric or climatic agencies, and that it is in no way attributable to "arrowing" or "checked arrowing."

I must admit that at first I was inclined to be of the same opinion, but after very careful investigations recently made on Mr. Rankin's farm at

Chatsworth, Mr. Geo. Morrison's at Goodwood Island, Mr. Law's at Harwood, and others, I have altered that opinion, and my observations, based purely on the physiological conditions of the cane, have led me to the conclusion that this disorder is to be attributed to "checked arrowing." I wish to draw a marked distinction between "arrowed cane," which has developed a healthy flower, and "checked arrow," which has failed to produce any flower.

Plants taken from "arrowed" cane will, as a rule, produce cane that will "arrow" unless outside influences interfere with the development, in which case failure on the part of the terminal bud to transform into the "arrow" produces, in my opinion, the present disorder; it makes the attempt and perishes over it. Whether from physical incapacity to reproduce its species, brought about by insufficient plant nourishment, propagating year after year from the same stock and exhausted soil, or whether this check is caused by climatic influences is a question I am not prepared to express a decided opinion upon.

The general appearance of the cane led me at first to fall in with the popular belief that the cane was affected with a blight, or rather, that a fungus attacked the leaves first, causing them to decay and die; and the cane being thus deprived of the functional requirements supplied by the leaves, became stunted, decayed, and gradually died out.

My recent investigations, however, have elicited the following facts:—

*External appearances.*

The stalk, at an early stage of the disease, looks perfectly healthy, especially in 10 or 12 months old cane.

The leaves and top gradually become decayed and withered; the lower leaves, though perfectly dead, cling closely to the body of the cane, proving that they have died out prematurely, before completing their natural functions. In many instances the buds on the upper joints have sprouted, pointing to the fact that the normal growth of the terminal bud or point of vegetation has received a fatal injury.

The buds that have sprouted also show marked signs of disorder, the radical leaves being twisted and distorted.

Stalks will often be seen in an affected field, which have completed the function of "arrowing," and have developed a healthy flower, and these particular stalks are healthy and have green leaves, in striking contrast to the affected stalks in the same stool.

The roots appear to be stunted, and to have penetrated only a few inches into the ground, and an entire stool of cane can often be dug up with one shallow dig of the spade.

On splitting open several hundreds of these canes lengthwise I could observe the disorder in its different stages.

The cane in its earliest stage exhibits no external signs of withering either in the stalk, leaves, or top, and to any but a close observer appears perfectly healthy.

On splitting open the cane, however, a light reddish discolouration will be discovered at the base of the terminal bud or point of vegetation. This discolouration is sometimes so faint as to be imperceptible to the naked eye, requiring a powerful lens to distinguish it. The discolouration deepens to a bright rusty red as it spreads. As it descends, the sap-vessels of the radical points on the nodes or joints become red and decayed, and in its ascent the top decays, dies, and gradually drops off. The decay of the stalk is very gradual, taking some six months and even more to completely die

out, and in many instances the decay is entirely arrested by suckers sprouting from the upper joints, which, in fact, take the place of the terminal bud. The stalk, when cut transversely, exudes a yellow gummy matter, which is causing considerable trouble to the mill-owners in the manufacture of sugar. I will refer to an instance of this later on.

Among the many affected stalks that I examined internally, I found some that had accomplished the early stage of "arrowing," the embryo, about the size of a coffee bean, being fully formed; others also were in various stages of development, even to the full formation of the panicle, but in all cases the "arrow" had been suppressed, and decay and fermentation had set in at the point of vegetation in the manner I have already described.

Referring to the yellow viscous matter that oozes from the cane when cut, I found Mr. Morrison, of Goodwood Island, was having great trouble with his diseased cane, and that it was with the greatest difficulty that he could get it to crystallise in the vacuum pan.

The juice in the pan was sticky, and had all the appearance and consistency of gum.

I obtained a sample of the juice taken from the rollers, had an analysis made of it, and, rather to my surprise, the analysis showed the following good results:—

| | |
|---|---|
| Cane sugar ... ... ... ... ... ... ... | 16·67 |
| Brix ... ... ... ... ... ... ... ... | 17·95 |
| Quotient of purity ... ... ... ... ... ... | ·93 |
| Specific gravity of juice ... ... ... ... ... | 1·0741 |

Equals 9·95 Beaumé.

I found that this analysis showed better results than the average of healthy cane crushed at the Harwood Mill, and that Mr. Morrison should have no difficulty in making sugar out of it. When, however, acetate of lead was applied to the juice, it had the effect of curdling it instead of defecating it, as in the case of sound juice.

Mr. Rankin, of Chatsworth, in giving me his experience of this disorder in the cane, says that he has over 100 acres of cane, the whole of which is affected. He first noticed that there was something wrong in the cane in July, 1891, after four nights of frost. Had it been cut that season as twelve-months-old cane, he estimated it would have averaged 13 tons to the acre, but it continued to wither and die, did not tassel, and when cut this season as two-year-old cane, gave an average of 10 tons of cane to the acre. There were 60 acres of this cane. On twelve-months-old plant cane the disorder was first noticed about the same time (July, 1891).

When planted, it made a good "spring," and continued to grow healthily till July last year.

The twelve-months-old ratoons were effected in the same way, but they were much worse than the plant cane.

Mr. Rankin believes that he propagated the disease two years ago by planting from unhealthy plants.

He is a strong advocate for the introduction of new varieties of cane from sugar-growing countries outside the Colony.

Mr. Morrison's experience of the disorder is very similar to that of Mr. Rankin's.

The whole of his area of cane, over 100 acres, is affected.

My reasons for attributing this disorder in the cane to "checked arrowing," are:—

1st. That its physiological condition points to its having made an effort to arrow.

2nd. That at the time the disorder makes its appearance, the cane has arrived at maturity, and is therefore disposed to "arrow." That in this condition it is very susceptible to cold or frost.

3rd. That healthy suckers spring from the roots, and healthy ratoons spring up and grow well until they arrive at maturity, when they succumb in the same manner as the parent plant.

The question "what causes this check in arrowing," is one difficult to answer satisfactorily. There are some who attribute it to climatic, and others to atmospheric influences, but so far, I have heard no tangible reasons advanced for these opinions.

It is for the very reason that I cannot propound any evincible theory to account for this suppression in the "arrow," that I am loath to express a decided opinion on the matter, at the same time I am inclined to attribute this suppression to the cold nights experienced during the early part of the winter.

I know I shall be at once met with the objection, that this has been an exceptionally mild winter, and yet the disorder in the cane has been more widespread this year than any previous year. Why did not the cane suffer from "checked arrowing," in former years when frosts prevailed?

To this I answer that in previous years the cane took longer to arrive at the "arrowing" stage, that period being delayed through the natural fertility of the soil, from which the terminal bud receives a supply of food and moisture sufficient for its demand. Under these conditions the stoppage of growth, which determines the ripening of the cane, is delayed.

If the condition of the cane at this period of "arrowing" is taken into consideration, it will be understood that it is necessarily more susceptible at this time to the variations of heat and cold. As I have already explained the development of "arrowing," it will only be necessary for me to state that the elongation of the terminal bud which eventuates into the "arrow" is delicate, watery, and easily injured, though, after complete development, it subsequently becomes much stronger, richer in substance, and more solid.

Again this disorder of "checked arrowing" is unknown in tropical countries, the usual development of "arrowing" occurring with regularity every year. Yet tropical countries are exposed to much the same climatic and atmospheric influences, with the exception of cold, as this district is.

I have so far refrained from making any remarks regarding the fertility of the soil on the Lower Clarence, as so much has been said and written on this subject, and it is familiar to everyone on this river that the land on the Lower Clarence does not possess the same depth of surface soil, the same porous subsoil, or the same amount of fertility, as that higher up the river, but from constant cropping year after year of the same variety of crop, grown from the same seed, the soil is evidently suffering from exhaustion, and the cane from deterioration.

Frequently have farmers remarked to me that exhaustion of the soil could not be the cause of the disorder in the cane, because they had planted a piece of virgin soil with cane, with the result that it was affected by the "blight," as they call it, but when asked where they obtained their plants, the reply always elicited the fact that the plants were obtained from cane grown some time on their farms where "arrowing" was prevalent, that they did not examine the plants carefully enough to state positively whether they were healthy or not, and the inference is that these plants were from cane suffering from "checked arrow," or from cane that had "arrowed."

I have so far dealt only with the effects of checked arrowing, I will now refer briefly to the result of planting "sets" taken from cane affected with "checked arrow."

As a rule these "sets" are taken when the decay has descended only to the few upper joints, and the external appearance of the cane is healthy.

The "sets" that are taken from these upper joints are in the following condition:—The sap-vessels of the radical points on the nodes or joints have commenced to decay, as is apparent by their red, rusty colour. Thus the rootlets that should issue from the radical points on the "sets" being decayed, cannot do so. The young plant, therefore, as I have previously explained, will live on the moisture, &c., contained in the parent "set" until that moisture is exhausted, or until the "set" dies or decays, which it does without completing its function of supplying moisture to the young plant until it is strong enough to throw out roots of its own.

The young plant, therefore, when the supply of moisture has been exhausted from the cane "set," shows signs of disorder. The top leaves turn yellow and wither, outer leaves, instead of expanding in a natural manner, close up at the top. In the meantime the inner leaves are growing, and become twisted and contorted in the endeavour to force themselves out of their confinement. Exactly the same development can be seen in the shoots which sprout from the growing cane suffering from "checked arrow." The plant eventually dies out at four or five months old, and though other suckers spring from the stool and from the "sets" taken from the lower joints of the cane which the decay had not reached, they never grow into vigorous canes, and when old enough make an abortive effort to "arrow," and die in the attempt.

It may be objected that in attributing the disorder in the cane to "checked-arrowing" I have given no explanation as to why this "checked arrowing" is confined to the Lower Clarence, and on the Upper River the "arrow" develops and produces a healthy tassel. In reply to this objection I would point to the fact that the soil on the Lower Clarence differs considerably from that on the upper portion of the river, being much poorer in those constituents necessary for the healthy growth of the cane. Both the soil and plants are proportionately deteriorated, and the plants are therefore in a much weaker condition than those on the Upper River, and I am inclined to think that as this "arrowing" function unfortunately occurs during the winter months, that in its enfeebled condition, further increased by its efforts to "arrow," it is more susceptible then than at any other time to cold, and that the "checking" in the "arrow" occurs at this time.

On the Upper River, owing to the more fertile nature of the soil, from which the plant is furnished with sufficient plant food, &c., to enable the terminal bud or point of vegetation to continue growth, the period of "arrowing" is delayed, and the winter months passed without the "arrowing" having taken place. I find that the cane on the upper portion of the river "arrows" at least two months later than cane on the Lower River. It is therefore not exposed to the cold nights in the condition of "arrowing" as the cane on the Lower Clarence is.

The remedy for this disorder is clear and self-evident.

All affected areas should be ploughed up and burnt or otherwise destroyed, and further propagation from infected plants immediately stopped.

The introduction of new varieties of cane is very desirable, but the plants when introduced should be subjected to antiseptic remedies, to prevent the introduction of any specific diseases from other countries.

In the meantime, plant cane should be obtained from the Richmond and Tweed Rivers, or even from the upper portion of this river, where "arrowing" has not yet occurred.

The Colonial Sugar Company have taken a step in the right direction, by supplying their farmers with healthy plants from the Upper Clarence and Richmond, but the benefit obtained will be only temporary, unless the farmers reciprocate by initiating a rational method of cultivation.

Believe me or not as you will, there is no disease but what is caused directly or indirectly by withholding from the plant the essentials necessary for its existence.

Return to the soil some of the elements that you have unsparingly deprived it of by a proper system of agriculture.

By this means you will give the plant an opportunity of growing vigorously, and under the conditions of food nourishment necessary to its development, the canes will grow healthy and strong.

There should exist between the farmer and his soil *reciprocity*.

# Experiments in Centrifugaling.*

THE following experiments were made to determine the influence of wash-water on the centrifugal. The *masse cuite* had a composition of sucrose, 73·1 per cent.; glucose, 7·69; moisture, 9·15; solids not sugar, 10·04.

It was taken hot from the pan and put into a car, and from this weights were taken. This work continued until the *masse cuite* got so hard that it had to be handled with a spade. Nine different experiments were made—three without any water, and the rest with water, varying from 2¼ to 25 per cent. It was contemplated at the beginning of the experiments to use saturated (white) sugar solutions in different quantities, as with pure water; but before getting to them, another influencing factor became visible, not counted on in the outset. As we proceeded the *masse cuite* cooled, and became harder, and gave relatively greater yields, until finally, by experiment No. 6, it was revealed that the cold *masse cuite*, washed with 5 per cent. of water, gave 7·8 per cent., and 5 per cent. more than the unwashed in the beginning of the experiment. It was now apparent that an increase in the crystals was taking place with the cooling, and any further experiments with a sugar solution as a wash could not be compared with those made while hot. Accordingly three more were made—two with the same quantity of water, and one without water.

The following are the experiments :—

| No. | Amount used, lbs, *masse cuite*. | How treated. | lbs. Sugar. | Analysis. | C.P. Sugar. |
|---|---|---|---|---|---|
| | lb. | | lb. | | |
| 1 | 100 | Without water ... ... ... ... | 51·1 | 94· | 53·76 |
| 2 | 100 | „ ... ... ... ... | 60· | 90·5 | 54·30 |
| 3 | 100 | With 12½ lb. water ... ... ... .. | 40· | 97·2 | 38·88 |
| 4 | 100 | „ 25 „ ... ... ... ... | 35· | 98·5 | 34·47 |
| 5 | 100 | „ 2¼ „ ... ... ... ... | 60·62 | 94·8 | 57·46 |
| 6 | 100 | „ 5 „ ... ... ... ... | 65· | 95·2 | 61·88 |
| 7 | 100 | „ 7½ „ ... ... ... ... | 45·60 | 93·8 | 42·76 |
| 8 | 100 | Mixed with 7½ lb. of water before centrifugaling. | 55·34 | 95·2 | 52·68 |
| 9 | 100 | Without water ... ... ... ... | 70·20 | 90· | 63·18 |

The centrifugal was taken to pieces and cleaned after each experiment, and in experiments Nos. 3 and 4, after the *masse cuite* was dried, and before adding the water, the basket was cleaned, and the subsequent washings caught, weighed, and analysed, with following results :—

No. 3 gave 30·6 lb. of washings, containing 48·2 per cent. sucrose and 4·48 per cent. glucose.

* From Bulletin No. 11 (second series) of the Sugar Experiment Station, Auduban Park, New Orleans, La., U.S.A.

No. 4 gave 56·2 lb. of washings, containing 48·8 per cent. sucrose and 4 per cent. glucose; 12½ lb. water then washed out of the centrifugal 14·74 lb. sugar and 1·37 lb. glucose, and 25 lb. water removed 27·42 lb. sugar and 2·24 lb. glucose.

From these experiments these conclusions can be drawn :—

1. That masse cuite in cooling gives a greater yield in the centrifugal, and suggests the propriety, adopted by many planters, of dropping their masse cuite into wagons and keeping for several hours in the hot room.
2. That mixing the water with masse cuite before centrifugaling, gives larger yields than using the same amount in the centrifugal.
3. That for every pound of water used in the centrifugal more than 1lb. of sugar is dissolved.

Commenting on the above, Mr. Despeissis says :—"In large sugar factories the practice is always to allow the masse cuite to cool and crystallize in shallow pans before centrifugaling. Water in small quantity is then added just at the moment the sugar is about to be extracted by centrifugal force. A jet of steam, directed by a pipe into the centrifugal, has the same effect as water. By this means the crystals are cleansed and separated from the treacle. The syrup, however, after being collected, has to be evaporated over again, cooled, and allowed to stand to nourish the crystals. Those extracted by means of the centrifugal form what is called 'seconds.' By repeating the process 'thirds' are obtained."

# The Vineyard and the Cellar.

By J. A. DESPEISSIS,
Department of Agriculture.

### *The Vineyard.*

During the month of January, at the time the grapes are turning, any negligence on the part of the vinegrower to cope with the parasitic diseases which are always more prevalent in the summer months, would, in a great measure, endanger the crop. When the grapes are changing colour a vital change comes over the constitution of the vines, which seem at this juncture to be less capable of throwing off diseases.

The vines should be dressed with sulphur for oïdium, and the last dressing of Bordeaux mixture should be given as a palliative remedy against the appearance of Anthracnose or Black Spot; on the early ripening table varieties *eau celeste* might be substituted for Bordeaux mixture, which soils the grapes somewhat, unless the carbonate of copper is washed away by rain before the picking season.

The last scarifying should also be done so as to keep the surface mellow and to eradicate any weeds that might be growing before they shed their seed, as it is not advisable to disturb the vines at the time their energy is concentrated on the operation of maturing the fruit.

Should the weather keep moist, and to prevent any danger of rotting, a few leaves might be sparsely thinned out, so as to promote the free circulation of the air and the access of light.

### *The Cellar.*

The casks, vats, presses, and wine-making appliances should be closely inspected, and any repairs they stand in need of duly carried out before the exigencies of the vintage absorb all the time and attention of the wine-maker.

## Raisin-making.

Considering the extraordinary natural advantages which this Colony possesses as regards dryness of climate, fertility of soil, and the suitability of a considerable area of country for the purpose of growing grapes for raisin-making, it is simply astounding that our enterprising farmers in the western and south-western districts should not as yet have added this profitable industry to their system of mixed farming. The advantages are evident and the returns highly remunerative. The demand, however, is limited, but still every pound of the £20,000 or £30,000 worth of raisins and currants imported annually into this Colony alone might, with much ease and profit, be produced here, thus saving to the country the exportation of a large sum of money, besides giving employment on the land to a large

number of labourers. Moreover it should be borne in mind that some of the best varieties of grapes for raisin-making, viz., Muscatel Gordo Blanco and its close parent Muscat of Alexandria, are likewise the most suitable for exportation to distant European markets as fresh fruit, so that by planting them the grower would have the alternative of either selling them as table grapes, exporting them fresh, or making them into raisins, while the unmarketable bunches would still be valuable for the still.

## Best Grapes for Raisins and Currants.

*Muscatel Gordo Blanco* stands easily first on the list of raisin grapes. It is very much like the Muscat of Alexandria, from which it is said to be a seedling, and differs from it by having a lower and more spreading growth, with closer bunches, rounder berries, covered with a thicker and finer bloom, which is more easily preserved during the processes of drying and packing than in the case of Muscats of Alexandria. Its other valuable characteristics are that it is a surer cropper than its parent, sets more freely, and is less subject to Anthracnose or Black Spot. It requires short pruning.

*Seedless Sultana.*—Much valued on account of the peculiarity which has given its name to the grape. When grown under favourable conditions it is a very heavy cropper, and is pruned long.

*Zante and Corinth Currants.*—Both requiring long pruning to bear a crop, and in South Australia, where they thrive well when planted on rich soil, I have seen them doing best when trained on trellises, and planted at a distance of 12 feet between the lines, and 24 feet in the rows. Between every two currant vines, three Muscat vines, pruned short and headed low, are planted at 6 feet apart. The currants are trellised about the fourth year, and taken over the tops of the raisin vines. For that purpose a 7-foot post is put at each currant vine. At the top of each post a cross-piece, 3 feet long, is bolted or nailed so as to form a T; a No. 10 steel wire is stretched at each end and another through the post, 1 foot from the top. Two long runners are trained along the lower wire, and the fruit shoots from it, tied up right and left alternately, to the two upper wires borne at the extremities of the cross piece. In that way the currant vines will meet each other in two or three years and can be kept quite clear of the Muscat vines growing beneath.

Muscats will give a good return the third year, while currants will not be in full bearing till the seventh or eighth year, but a crop will be picked the fifth.

*Picking.*—The grapes should never be picked for drying before they are dead ripe.

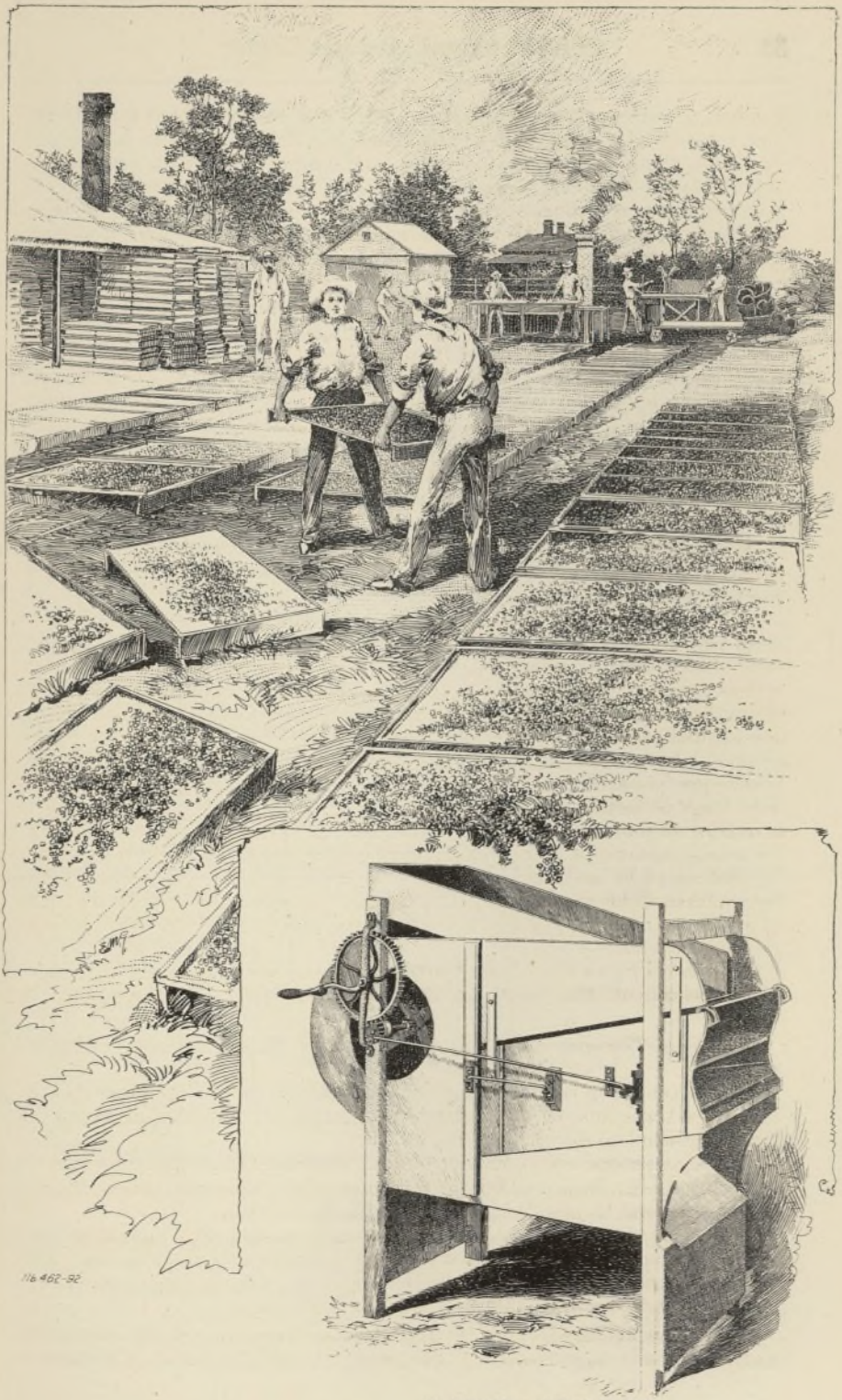
The currant crop is ready for picking a fortnight before the Muscats, and the same trays answer for drying both crops, so that the advantage of growing them together is evident.

There are several ways of ascertaining whether the crop is fully ripe:—

1st. By the colour, which, in the case of the Muscatel Gordo Blanco, should be a bright amber, and also by the taste.

2nd. By the saccharometer, which gives more accurate indications, as a bunch grown in the shade may be ripe and yet colourless. It is reckoned that the juice of the grape should contain at least 25 per cent. of grape sugar to produce a good raisin.

Great care should be taken in picking not to remove the bloom, which would spoil the appearance of the raisin. For that reason the bunch is



RAISIN GRADER.

RAISIN-DRYING IN AUSTRALIA.

handled by the stem, cut with a sharp knife, all imperfect berries, pieces of stalk, dead leaves removed, and then placed upon either shallow baskets or directly upon the trays right side up, *i.e.*, the side showing less of the stem. In large vineyards there is economy in placing the trays between the rows of vines and covering them at once with grapes, whereas on a small vineyard it may be convenient to take them all to the kiln or to the drying terrace.

## Table Raisins

Are very easily dried. The finest bunches having been carefully picked, as described, they are simply put on wooden trays, made 2 feet wide and 3 feet long. If too large they are not so convenient to handle when filled. Each tray receives 20 lb. to 30 lb. of grapes, which should produce 6 lb. to 10 lb. of raisins, after having been put out in the sun or in the kiln to dry.

Upon the state of the weather and the size and degree of ripeness of the berries will the time required for drying depend. Rapid drying gives a hard and tough raisin, and should be avoided. At the end of eight to fourteen days, according to circumstances, the grapes being about two-thirds dry, are turned, by placing an empty tray on the top of a full one, and turning them over. A piece of board, 1½ inch to 2 inches high, is nailed at each end of the tray, so that there is always a clear space between them, and the berries are not crushed while turning, when, on the other hand, should the weather turn wet, or the dew be abundant at night, the trays can be stacked one upon another. After turning the drying will proceed more rapidly, and the raisins should be watched to prevent them from becoming too dry.

*Sweat-box.*—If the raisins on the trays are examined, some of them will be found dry enough, while some of them may be too dry, and some not sufficiently cured. At this stage the sweat-box is found useful for equalising the sample, and making the stems tough and ready for packing. The sweat-boxes are 7 inches to 8 inches deep, and large enough to admit a tray easily. They contain 110 lb. to 120 lb. of raisins. When emptying the contents of the trays into the sweat-boxes all bunches which are insufficiently dry are placed on a fresh tray for further drying. A ready method of ascertaining whether the berries are sufficiently dry is to roll them gently between the thumb and the finger. If any liquid exudes at the stem end the raisins require further drying.

In transferring the contents of the trays into the sweat-box the raisins are slid off in the same position as when they lay on the tray; to prevent the stems getting entangled two sheets of Manilla paper of the size of the box are put in at intervals as the box is being filled. The sorters have two or three sweat-boxes, and grade the raisins into first, second, and third quality.

When the sweat-boxes are full they are put away one on the top of another for ten to twelve days to sweat, after which they are taken to the packing room, which is provided with tables, scales, presses, and neat boxes of different sizes, holding 5 lb., 10 lb., 15 lb., and 20 lb., in layers of 5 lb. each.

## Pudding Raisins

Are sometimes made of the same grape when loose and of inferior quality, and also of the Seedless Sultana.

For that purpose the grapes are picked when ripe, put into ozier baskets, and dipped for fifteen to twenty seconds in boiling lye, made of 1 lb. of potash, or of washing soda, to 3 gallons of water, and then plunged in fresh water for a rinsing, and then placed on trays. The object of the dipping is

to make the drying process more active, by dissolving or saponifying the waxy covering which constitutes the bloom, and opening up the pores on the skin, thereby allowing the moisture to escape more freely from the fruit.

The grapes are then placed on trays, put on a truck, which is wheeled for a few minutes into a small hut, which can be hermetically closed, and in which sulphur is burning. The sulphuring is done with a view of obtaining the well-known amber colour of the pudding raisins, which does not in any way improve its quality, but is merely done to comply with the demand of the market. From the sulphur chamber the raisins are dried either partially or entirely on the trays, and put through the stemmer and grader. The stemmer removes the berries from the stems, and the grader, by separating according to size, determines the grade.

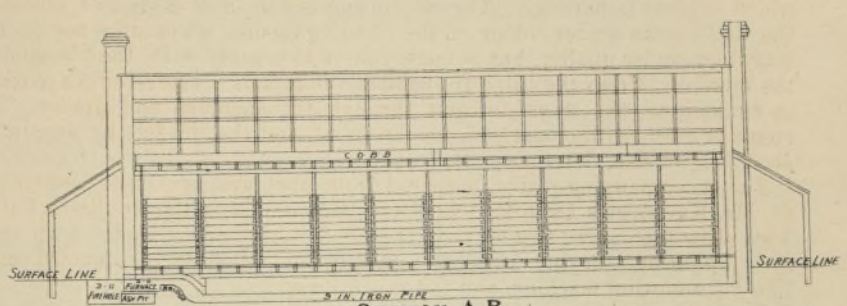
The accompanying plates, prepared from photographs I took last vintage at Mr. Kavanagh's Lake Erie vineyard, Mooroopna, in the Goulburn Valley, Vic., show the drying terrace with the lye furnace; truck loaded with trays for sulphuring; drying kiln; also the grader, which is constructed much like a winnowing machine, and the raisin press.

Since the introduction of evaporators and kilns for drying fruits and raisins, the industry has been successfully and extensively carried out in districts which, owing to the uncertainty and the wetness of the seasons, would not permit of conducting the process of fruit-drying, simple as it is, in the open air. For the information of vinegrowers who might be desirous of constructing a cheap and efficient drying kiln, the following plan, with accompanying specifications, is submitted:—

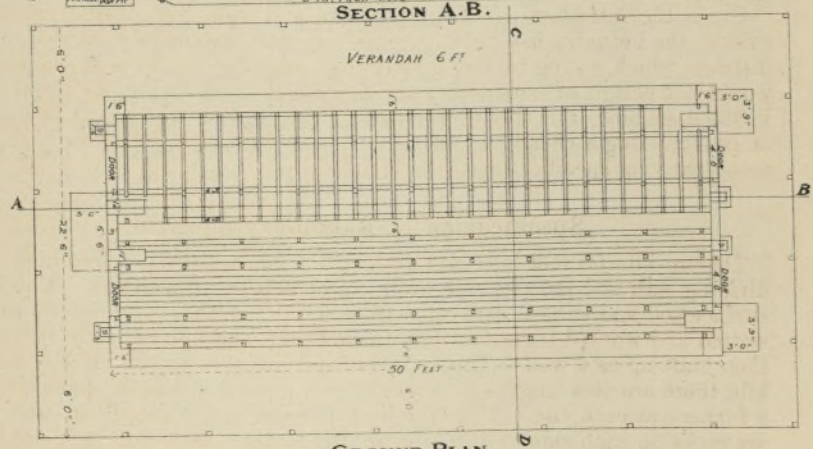
## Specification of Raisin-drying Kiln.

Drying kiln 50 feet long and 22 feet 6 inches wide and 8 feet high. The dividing wall and the two side walls are of cob 18 inches thick. Cob is the surface soil and subsoil excavated from the site of the building, thoroughly wetted and worked together, then turned over and mixed with straw, and then built up as a wall. The two ends and furnaces are of brick. In each kiln there are two lengths of wrought-iron pipes 9 inches in diameter, with a furnace at each end. Thus the heat is equalised throughout, and there are racks on each side of the kiln on which ten trays can be placed over each other, and ten trays in length. Thus in the two kilns four hundred trays can be put in at a time.

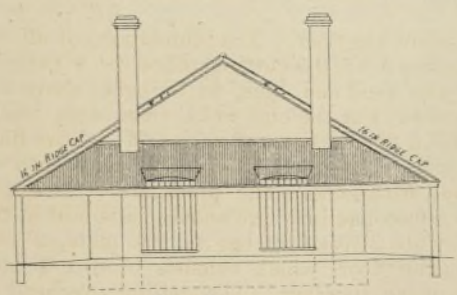
The iron pipes are laid 2 feet below the floor. The foundations of all the walls are first dug out 2 feet 3 inches deep, the cuttings filled in with concrete, made of gravel, broken stones, sand and lime, to 3 inches above the surface for the centre and side walls. For the end walls start with brickwork from the bottom, so as to build two furnaces at each end and two flues for the furnaces at the opposite ends. Dig the centre out to the depth of the foundations, and build the wall with same. The pipes are 9 inches in diameter, made in 4-feet lengths telescoped into one another and laid in the bottom of the ground. Thus they are 2 feet 3 inches in the plate, 2 feet 5 inches below the joists carrying the floor, which consists of 6 x 1 inch boards laid roughly and nearly close together. The ceiling overhead is covered with 9 inches of mud cob, same as walls, over which is a galvanised iron roof and a verandah.



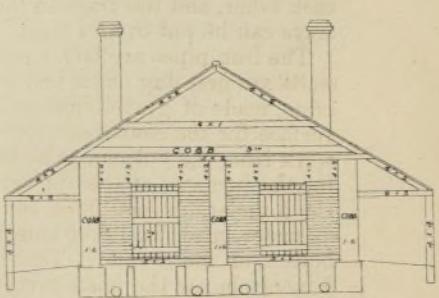

SECTION A.B.




GROUND PLAN




END ELEVATION.




SECTION C.D.

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PLAN OF DRYING KILN.

# The Australian Wine Trade.*

By HANS W. IRVINE.

The most confirmed sceptics have been compelled to confess that it is possible to produce various wines of excellent class and character in Australia. The weight of evidence is such that there is no longer any room for doubt on this point. The soil and climate in many districts of Victoria, South Australia, New South Wales, Western Australia, and Queensland have been found generously responsive to the efforts of the vignerons; and many of the leading wine merchants of London and other important commercial centres admit that Australia promises to become a powerful rival in the world's markets with the old-established vineyards of Europe.

Land that the pioneers of this country counted worthless for cultivation purposes has been found peculiarly suited to the growth of the vine and for the production of light and full-bodied wines. There are hundreds of thousands of acres of land, scrub covered and ignored by the selector, that is admirably adapted for purposes of viticulture; while many of the richer soils which have been brought under cultivation are specially suited to the production of wines of an excellent character.

Gold-mining—the industry which laid the foundation of success in Australia, and which has placed Victoria in the proud position she holds to-day among the British colonies—is rapidly declining, but in process of time I doubt not but that the old gold-fields, and some of the vast areas of country at this moment reserved for mining purposes, once they have been thoroughly prospected, will be thrown open for cultivation, and there will settle thereupon men of experience, pluck, and foresight, who will speedily convert the wilderness into flourishing, picturesque, and thriving vineyards and orchards. In the stead of the gold-mining industry to which we are largely indebted for our present prosperity there is springing up another, which will give better hostages to fortune and guarantee a greater permanency to the well-being of the several colonies constituting Australia than has hitherto been enjoyed.

It is gratifying to know that many of the wines of Australia have suffered no disparagement when compared with some of the rarest European vintages, but on the other hand Australian vignerons have much cause for gratulation in that their wines compare so well as they do with the world-famous products of France, Germany, and Spain. This is the more satisfactory, as wine-making has formed a leading feature of the industries of Europe from time immemorial, while it has but recently been recognised as of any great importance here. From a viticulturist's point of view the

* Compiled at the request of the Minister of Agriculture, Victoria, and published by the Victorian Department.

advantages are largely with the European growers, who have centuries of experience to guide them in the management of their vineyards and wines. The Australian growers have, metaphorically, to feel their way, and avail themselves of such opportunities as present themselves for acquiring information.

The peculiarities of the Australian soil and climate are being carefully noted, and such experience has been gained in this respect that already the observant wine-grower knows the kind of vines to plant and the quality and character of the wines produced in the several wine-growing districts of Australia. It may, therefore, be claimed that the first, or experimental, stage is past, and that the wine-grower can confidently look forward to reaping an abundant harvest; the result, of course, will depend upon whether the teachings of the past have been taken advantage of.

It is at once interesting and instructive to study the

## Growth and Progress of Viticulture

in Australia, as therein one learns where the pioneers of the industry have erred; where they have secured a victory; and in what manner they have succeeded in bringing it to that stage we find it occupying to-day. Although the pioneers made many attempts to create an export trade with Great Britain, it was not until the Indian and Colonial Exhibition, held in London in 1885–6, that much attention was practically given to the resources of Australia as a promising wine-producing country.

Though success did not attend the efforts of the pioneers in the establishment of an export trade, with praiseworthy persistency they did not relax their efforts for a moment. The failure they experienced may, in a large part, be accounted for by the fact that they were ahead of the times. In forcing the trade before there was a sufficiency of matured wines here to back their efforts they subjected Australia to an unfair comparison with the wines of Bordeaux and other important and old-established centres of Europe. Nor should the blame of this be attributed wholly to the pioneer exporters, who, we are well aware, were in a measure forced to this course by reason of the small home consumption. Growers should now be in a position to take advantage of the causes of failure, and determine to ship only such wines as, calculated on the basis of the experience gained, would command a large and ready sale. The pioneers of the industry saw the necessity of (1) ascertaining if the wines of Australia would suit and command a market in England when compared with the vintages of the world; and (2), in the event of such proving to be the case, whether it would be advisable to bring larger areas under vines, so as to provide for the establishment of the trade on a larger scale.

It may now be assumed that Australian wine shippers are conversant with what is required of them and of what has actually been accomplished. For much of the knowledge, as also for the sound prospects which the industry enjoys at this moment, those engaged in the wine trade to-day are under a debt of gratitude to the founders of the industry, who, at heavy pecuniary loss and much personal inconvenience, paved the way for an enormous trade.

The progress has been painfully slow. So long ago as 1873 large parcels of wines were sent respectively to London and Vienna for exhibition from this country. At both places the wines were highly spoken of, and at Vienna the highest award—the diploma of honour—was awarded the Victorian exhibit. From that time to the present the wines have continued to grow in favour, yet one must perforce confess that the results still fall

far short of expectations. The future, however, is brighter, rosier, more encouraging than it has hitherto seemed. It only required to be clearly demonstrated that viticulture might be profitably practised in Australia to induce many people who had been giving some thought to the subject to plant the vine. Others who had established small vineyards, cheered by successes gained by Australian growers, entered into the industry with greater zest, until such is the momentum now acquired that if due care and attention is paid to planting the proper kinds of vines, and the laws of fermentation, &c., are thoroughly mastered and utilised in the manufacture of wines, a higher standard will be attained, and the result will be a larger export trade.

Some conception of the importance of viticulture may be obtained from the following statistics, culled from a report issued by the French Government:—The approximate value of the 1890 vintage to France was nearly £40,000,000 sterling. Out of this £40,000,000, the produce of the Gironde alone was valued at a little over £6,000,000 sterling, or, to put it in other words, over a sixth of the total value of wines produced in France in that year (1890) came from that department. Not many years ago the quantity of wine produced in France was nearly double that of 1890. It will be understood that this was prior to the disastrous ravages of phylloxera. It is estimated that not fewer than 23,000,000 people in one way or another find employment throughout the year in connection with viticulture in France alone.

Therefore, in speaking of this industry, its capacity for affording labour is a feature that should be borne constantly in mind. Every additional acre planted with vines creates a demand for workers. Consequently the value of the expansion of viticulture gains in importance; for not only does it mean an additional output of wine, but it creates an increased demand for coopers, carpenters, builders, machinists, mechanics, and numerous other tradesmen. The avenues opened up are innumerable, and vignerons are pardonable if they claim that they are founding an industry which will assist largely to absorb the surplus labour which at this moment is causing so much anxiety to all classes of society. Our exports in wine will hereafter have an important bearing upon the maritime trade of the colonies. But what is the use of multiplying examples when the fact is obvious that the ramifications of this young and budding industry are beyond calculation? Nothing could more satisfactorily demonstrate the important position which viticulture has already assumed among our most valuable industries than its expansion during the last few years. In 1888–9 the area under vines in Victoria alone was 12,889 acres, or 1,691 acres more than in 1887–8. The quantity of wine returned was 1,209,442 gallons in 1888–9, or about 42,000 gallons more than in 1887–8, and 206,000 gallons more than in 1885–6. In 1889–90 there were 15,662 acres under vines in this colony, or an increase of 2,773 acres for the twelve months. The quantity of wine returned was 1,578,590 gallons, or more than in 1888–9 by nearly 370,000 gallons, and for 1891 the yield was estimated at 2,008,493 gallons. It is gratifying to observe that the area now under cultivation, but not in bearing, will, in the course of, say, five, or perhaps six, years more than double the present yield, while other large areas are yearly being planted in districts known to be suitable for the production of high-class wines, so that it is only reasonable to suppose that, say, in ten years' time, Victoria, apart from the other colonies, which are also largely and rapidly increasing their areas of vines, will be in a position to export millions of gallons, whereas she can only at present ship hundreds of thousands of gallons. Victoria is in the vanguard,

so far as viticulture is concerned, among the Australian colonies. According to the Government Statist, at the end of the year 1889 the area under vines and the yields in the various colonies were respectively as follows:—

| | Acres. | | Gallons. |
|---|---|---|---|
| Victoria ... ... | 15,662 | yielding | 1,578,590 |
| New South Wales | 7,867 | „ | 688,685 |
| South Australia .. | 7,352 | „ | 510,674 |
| Queensland ... | 1,763 | „ | 164,626 |

In 1873 there were only 5,222 acres planted in vines in Victoria, and the yield has been estimated at 562,713 gallons, showing an increase for the sixteen years ending 1889 in the area planted of 10,440 acres, and an increase in the yield of 1,015,877 gallons.

The industry progressing at such a rate, and giving such satisfactory indications of still more rapid advancement in the future, the necessity for seeing that it is conducted on proper lines is clearly apparent. The future may bode for this industry good or ill, but we have the controlling of our own destiny. Everything depends upon ourselves. Nature in Australia is most bountiful, and if we avail ourselves of the teachings of the past we may anticipate a glorious prosperity.

Notwithstanding the increase in the amount of wine produced in Victoria, the revenue derivable from the import duty in wines arriving here from other countries was, for 1888–9, £53,147, the largest amount since 1865, when it realised £46,509. These figures may be somewhat difficult to understand, but when we remember that the population in 1865 was only 621,095, and that the population in 1889 was 1,118,028, we may the more readily comprehend the lesson they teach. The revenue from imported wines has fallen off considerably, *pro rata* to the population, since 1865.

The population of Victoria at the last census was 1,140,000, and, as stated already, the quantity of wine produced was 1,578,590 gallons. This wine added to that imported, after deducting that exported, amounts on the average to rather over a gallon per head. The value of the wine produced, as shown, has been on an ascending ratio. In 1883 the value of the wine exported was £11,493; in 1884, £13,450; in 1885, £15,362; in 1886, £27,094; in 1887, £29,345; and in 1888, £33,273, the highest amount reached up to that date.

## Australian Wines in the English Market.

The time has arrived when Australian vignerons should be made acquainted with the manner in which our export trade with London is conducted, and the causes which hamper and retard its progress, as, unless the evils are removed, there is but a shadowy prospect of it expanding proportionately to the increase of production here. Wines hitherto purchased by large English buyers have consisted in most part of full-bodied, crude, and coarse young wines of great alcoholic strength. One leading wine merchant in London, through his agent here, stated some time ago that he wanted wines that would register 24 per cent. proof spirit or over, as under that strength they did not carry well or meet the requirements of the trade, and, further, that the demand in England was for that type of wine. As much over as possible, I should say, for this and many other firms dealing in Australian wines in England, inasmuch as they are ignorant beyond belief of any special knowledge of how to treat the finer and more delicate wines, which require not only care but skill and experience, in order that their latent qualities may be properly developed.

In the hands of such men as dominate the Australian wine trade in England our finest vintages, through lack of knowledge and neglect in working, are apt to "go off," as is the case with all really good and delicate wines if not properly cared for; and then we are told that Australian wines, unless strongly fortified with spirit, will not keep.

The merchants appear to be blissfully unconscious of the fact that in nine-tenths of the cases where the wines have gone bad after arrival it was due solely to their own inexperience as to the treatment they should have received. Many inferior wines are purchased in Australia at low rates, but, considering their quality, at their full value, which may go bad through neglect or in consequence of not having been properly fermented, it is only natural to suppose that wines of this kind will deteriorate still further. Yet they are shipped, and on their arrival in London are "restored," and straightway sold as cheap wines, although they are in many cases decidedly faulty. The restoration after "treatment" consists chiefly of blending them with full, heavy, rich wines from warmer districts, and thus "clothed" and disguised they are sent into consumption as quickly as possible. But the imperfections are only temporarily hidden, and the bad wine speedily commences to assert its supremacy over the good, and in the course of a few weeks, or at most a few months, the whole becomes more faulty and unpalatable. Those who are ignorant of these practices, and who confide implicitly in their merchants, often find their trust abused. They are told that wine improves with age, but they are not told that it is only good, sound, and well-made wine that improves. The customer innocently makes his purchase, stores his wine for a few months or years to allow it to mature, and when, at the expiration of the specified time, he finds that instead of the wine (*sic*) having matured, it has become vinegar, or some mawkish stuff, out of condition and poor in bouquet and quality, his disgust and vexation may be imagined.

I was frequently told when in England that Australian wines would not keep. Several of those with whom I had had conversation had tried them, and condemned them outright. Many of the widely advertised Australian wines of the cheap order, such as I have described above, and which, though fairly satisfactory to the taste for a few months, after leaving the merchants' cellars rapidly decline in character instead of steadily improving with age, as they should do if good, sound, clean wines when bottled. I regret to say that this class of wines constitutes the great bulk of the trade done in Australian wines in England to-day; or, allowing that the cheap class of wines so freely sold in England, in most cases are sound when bottled, as undoubtedly they are, still their youth should be a sufficient reason for their not being bottled, as they are too green and crude, and have not been sufficiently worked and attended to in cask ever to develop into high-class wines, or achieve the promise of their birth; they should first be allowed to attain some measure of cask ripeness. If stored and attended to by the merchants for only a year these good, but green, wines would largely improve in bottle, and assist in adding to our reputation, instead of, as at present, keeping us, to a great extent, on the level of the inferior and cheap wine-producing countries of the world. Very urgent reform is required in this respect, and a better system of storage, until matured, is necessary, as to-day the bulk of the wines sold in bottle in England do not fairly or justly represent the finer growths of Australia. Vignerons generally cannot be expected to store wines till matured—that is the acknowledged work of the merchants—but, as I have previously stated, most of those engaged in the trade in England buy to-day to sell to-morrow, so to speak; and if for this reason alone, and knowing how

some of them conduct their business, it is specially necessary to provide that only good sound wines are allowed to be exported, or otherwise it will be to the detriment of viticulture generally throughout Australia.

I will give one instance out of six or seven that came under my notice while in England, illustrative of what I have just said. I was introduced by a member of the Australian press, in England, to an historical hotel, "Ye Cheshire Cheese." I was unacquainted with the proprietor, and he, upon learning that I was an Australian and identified with the wine trade, at once volunteered to let me taste one of, what he called, the best Australian wines in England, and which he had had laid down in his cellar to improve for some time. I thanked him, and the cellarman was straightway despatched to bring up a bottle. In the meantime another gentleman entered the apartment, to whom I was promptly introduced. I was told that he was the friend of Mr. ——, a leading light in the wine trade. While conversing with him, the wine sent for had been brought and poured out. Judge then of my astonishment when, before I had taken my glass in hand, to hear the friend of Mr. —— exclaim, "I say, Charlie, this is vinegar!" and I was able to fully endorse the statement without having tasted it, the aroma being quite sufficient to condemn it, and proclaim it "acetic." The look of disgust on the countenance of our host was comical to witness, and his air of wounded vanity I shall long remember as he remarked, "I prided myself that you would be able to taste a glass of wine that would please you, and that would do Australia credit. That wine has been in my possession for years. I thought I would lay it down to improve with age, and it turns out like this! We get no encouragement to buy Australian wines—they will not keep." I looked at the brand, and to my amusement found it was one of the most expensive and best advertised samples of Australian wines sold in England, and if any wine ought to have been good, and have given good results, this certainly should have done so. Possibly it had been one of the "clothed" wines already referred to. I have no doubt of it myself, and would question whether it ever was at the vineyard it purported to come from. I am reminded of another instance. I was told on interviewing a gentleman, who was of great assistance to me, and who also takes a keen interest in the Australian wine trade, that out of fifty complaints received in 1890, in connection with a business of nearly £350,000 per annum in wines and spirits alone, and of which he was one of the ruling heads, that forty of the complaints were in connection with the Australian wine trade, of which they sold only a very small quantity, consisting mostly of the best known brands put up, and widely advertised by the merchants. The number of complaints in a gigantic overturn like this, is infinitesimal in proportion to the business done; but when poor Australia is represented only to the extent of a few thousand dozens, representing a few thousand pounds sterling, and four-tenths of the complaints are in connection with her produce, is it any wonder that *bonâ fide* merchants and others, who would take warm interest in developing the trade, have become disgusted with it. Some of the disgusted ones, however, are compelled to keep some stocks in hand, as, through profuse advertising, they are asked for it, but it is needless to say they are small, and only kept to supply the demands of customers who may particularly desire them.

The gentleman above referred to spoke highly of some Australian wines that he had tasted direct from the growers, and through their *bonâ fide* agents, and not received through the middlemen, but he condemned in no measured terms the present commercial or uncommercial manner in which the wines were sent forward from Australia, and still more the English

merchants for placing inferior and faulty wines before the consumers. He told me they could not rely upon receiving the same class and character of any wine twice in succession.

Speaking from my personal experience, and from conversations I had with gentlemen who have given some attention to the subject, I am convinced that most of our wines, handled as they are in London, will not do us credit or improve in value as they ought. In defiance of the statements made by London merchants and others, I maintain, as I have proved it, that wines of low alcoholic strengh will keep and improve with age, and if properly fermented before shipping, and carefully managed on arrival at their destination, as all wines ought to be, the complaints I have enumerated would be removed. As a rule, however, as quickly as possible after arrival (and sometimes wines are shipped from Australia under twelve months old), the wines are fined, bottled, and sent into consumption, and I do not hesitate to say that in some instances they have been consumed by the British public when little more than twelve months old. No wonder, under such circumstances, that some of our wines have gained an undesirable reputation as inferior, crude, of no character, and that they deposit a heavy crust of tartar on the bottles. Practical wine-growers know that this should have come out in the bulk by working, and with age. To those who understand the causes, as well as to the uninitiated, this sediment renders the wine dull and unpleasing to the eye. Sometimes young and badly fermented wines are bottled, with the result that the bottles are shattered as a secondary fermentation sets in, and, as happened prior to my visit to London, an explosion of this kind occurred in one of the large retail stores, and an expensive plate-glass window was broken to pieces. The merchant who had supplied the wine, I was informed, paid the cost of repairing the damage.

I would reiterate that wines are frequently, through ignorance, bottled when in a state of fermentation. They are also badly blended, do not receive sufficient care or attention, and are invariably handled by men (though there are some exceptions, I am glad to say) whose sole desire seems to be to make money quickly, regardless of the interests of others. Such men are indeed amassing wealth, solely through an extensive system of advertising, for which I give them credit for conducting on a magnificent scale. The public are the more easily attracted by these advertisements, in that they have a kindly feeling towards Australia or anything Australian. This parental regard to this country renders the British public the more easily gulled, and it is, without doubt, being taken advantage of to a very large extent. The question which pricks home to us is, "Are we, knowing these things, going to rest content, and allow others engaged in the merchandising of our produce to reap the benefits of the whole of our years of toil, smirch our fair fame, and by trickery and ill-disguised cunning, in the way of advertising, work the ruin of the trade which we have for so long, and with much pains, endeavoured to build up?"

The people of England will help us if we will only help ourselves, but we cannot expect that their forbearance will last much longer if the present order of things is perpetuated. Some of the men who are at present engaged in the industry are, without question, making large yearly profits, and yet they proceed on the same lines as they did years ago, holding no stocks worth considering, and offering the lowest prices, without a thought of encouraging the exportation of the better and matured qualities, for which higher values would be obtained. One large merchant was advertising, when I left England, that he had a thousand hogsheads of wine in stock, in a trade paper. What is a thousand hogsheads? At most but 60,000 gallons,

and should represent but three months' trade in a business the magnitude of that transacted by the merchant in question. Such a business should never have less than three years' supply, and then there would, to some extent, be a guarantee that the wine sold was matured, and not twelve months' old wine, purchased in Australia at from 1s. 6d. up to 2s. 6d., or, in rare cases, 3s. per gallon, and sold through the various agencies and grocers, as well as direct to any one ordering, at from 16s. to 42s. per dozen quarts, and even higher rates. The profits, as I have already stated, resulting from this class of trade are enormous, but the encouragement to the grower is *nil*, and the prices offered and paid are far from being commensurate with the labour entailed upon him, and the risk he incurs, the many years of weary waiting he experienced before his vineyard yielded him any return; and these matters are altogether apart from the large expense that must necessarily be contracted for casks, cellars, &c. The merchants who rule the trade to-day resent an independent grower coming forward with large parcels of wine himself in England. They would, if possible, prevent him from ascertaining what the future prospects are like, and place every obstacle in his path, so that he might not learn what the probabilities of an increased trade really are. They endeavour to persuade him that they have sufficient stocks on hand, and, therefore, are not in need of further supplies for some time; as a matter of fact, they are anxious to obtain the wine, but, in pursuance of their policy, they harass the independent shipper, so as to discourage him from making any further attempt to break down their monopoly. They feel assured that the shipper, unable to find buyers, will agree ultimately to sell to them at lower rates. They are confident that it is only a question of waiting, and they will be able to dictate their own terms absolutely to the unfortunate shipper. I regret to say that they are generally correct in their opinions. Misguided Australian growers, who forward shipments to London as a speculation, commit a grievous error, insomuch as they aid the merchants to obtain the consummation of their desires. Small or large growers, who have not sufficient capital behind them to render them independent of the big wine monopolists, might, with as much chance of profits, pour the wines down the channels of the street as send it forward unsold, expecting to get fair prices without being there to superintend the sale or have a representative or agent to attend to it, and push the sale. Buyers are few, and some do not scruple to turn the opportunity to their own advantage. Unless some one interested in the trade is on the spot, and understands the relative values of the wines shipped, the old, old story of the spider and the fly will continue to be repeated.

One large merchant asked me to taste a sample of Australian wine, which had just come out of bond, when I was in his cellar one day, and to give my opinion of it. I did so, and at once told him that it had been a good wine, but through neglect had perished and become flat and dead. He told me that that wine had been shipped from Australia unsold, and had been offered to him twelve months previously, when he declined to purchase, and that he had just bought it at 10d. or 1s. per gallon—I forget which. At that price it would not pay for the empty casks, freight, and storage, so that the shipper would be a heavy loser on the transaction, besides losing the wine. The wine, no doubt, when first offered was young, but good, and worth at least 2s. 6d. per gallon, but it had been sent forward independently, and was therefore poaching on the merchants' manor. Their absolute right to govern and rule the Australian wine trade has been invaded, and his temerity was punished by a refusal to purchase. The merchants alluded to are keenly alive to the fact that if they tolerate the intrusion of growers their autocracy

would from that moment diminish. The new *régime* would mean enhanced prices for the growers, and consequently less profits for themselves; so that, when possible, they resist every effort of the producer to ship direct for sale, as having a tendency of attracting other merchants' attention to the qualities of the wine and the advantages of the trade.

I should indeed be sorry to think that all the London wine merchants in the Australian wine trade were of the same stamp. There are some among them of upright character—men of strict integrity; to do business with whom is a pleasure. Such gentlemen know that my remarks are quite justified, and that I am quoting facts and relating things as I found them, some things extenuating but naught setting down in malice. No doubt much I have said on this subject will be most unpalatable to some, but if the cap fits they may wear it. Although I do not think my remarks will produce any salutary change in them, I am of opinion that it will impel them to greater caution hereafter, as it will suffice to show them that their manner of conducting business is understood out here; and who can say that it will not result in reforms that will redound to our benefit.

I experienced little difficulty in disposing of the whole parcel of wine I had forwarded—over 200 casks—in one line, and at a satisfactory price, being there to superintend the sale myself. I had subsequently the pleasure of hearing that the man who had laboured most to impress me with his own omnipotence, and of the inutility of endeavouring to sell Australian wines at that time in England, as well as the utter folly of Australian growers endeavouring to force a trade independently of the merchants who try to rule it, had, directly upon hearing that I had sold my wines, though he had written to me previously, as well as stated verbally, that he had very heavy stocks, and did not require any wines as the dull season was coming on, &c., &c., bought up in conjunction with, and through another merchant a large quantity of the wines I had sold, and at a good advance upon the prices I had obtained, and at a considerably higher figure than he pays for most of his shipments, and the class of wines in which he has his largest transactions. Needless to say, all this was highly satisfactory to me. The merchant just alluded to afterwards expressed his chagrin, and annoyance at having "stultified" his own action, and I sincerely trust he will take the lesson to heart.

I have said sufficient to show the necessity there is for Australian exporters to take concerted action to protect their interests—to see, most of all, that Australian wines reach the British consumer in a proper condition. This once accomplished, and I do not hesitate to say that very speedily the demand will be such that there will be no difficulty to find a profitable market for all we can at present produce as also the increased production of coming years. The merchants, as I have shown already, who have secured an apparent monopoly have been, and are, the lions in the path, but if sensible means are adopted they will be found powerless to hinder the expansion of the trade to any very appreciable extent.

Many good unblended wines are sold in England by the merchants I have adversely criticised, but the difficulty is, after obtaining them, to know whether you will be able to secure the same quality and character again. The smallness of the stocks held by merchants is alone sufficient to proclaim some inability to guarantee further supplies of the same sorts of wine; and this fact, considered in conjunction with the low price paid to growers for wines which are not stored on arrival until matured, explains the reason for the numerous complaints made against the Australian product. This is an evil that calls for prompt remedy, particularly if we desire to see our trade placed upon a basis like that of the good Bordeaux houses. As to the

shipment of wines of low alcoholic strength, I am fully persuaded that they will carry well, provided that they are properly fermented, fined, carefully attended to, and placed in good clean casks.

To still further illustrate the position assumed by some of the London merchants to the Australian trade, I may mention here that while I was in England I was informed by letter from Victoria that one of the leading wine merchants in London had written to his Australian agent or buyer, informing him that the wines which I have referred to as having sold in one line, and which I had shipped a month ahead of my visit, had arrived in bad condition. The merchant who made this statement well knew at the time of doing so that the very opposite was the case, as he subsequently told me personally that wines rarely arrived in such good condition. This latter assertion I did not credit, nor do I do so at this moment; and it is just possible that immediately after conversing with me, and praising the wines, he sent off the letter referred to to his Australian agent. I have a shrewd suspicion that his only reason for taking the action he did was to cause a still further tendency to lower prices, and to impress the unsophisticated grower with the difficulties (imaginary ones, of course) of shipping and selling wines in England from Australia, as also of the great drawbacks to the trade, &c.; so that in sheer desperation the poor grower, not feeling certain of securing a buyer who would pay proper values, would accept the prices offered rather than run the risk of failure, and probable further loss through having to hold his stocks for a greater length of time. I have no doubt the story about the bad condition of wines referred to was told to many vignerons in Australia by the agent of the London merchant, but I acquit that gentleman of knowingly stating what he knew was not true. I had the wines examined by a chemical expert in England for the sake of having evidence as to how the wines had really arrived, and consequently I was in a position to combat many of the theories industriously propagated by men of the class I have referred to. The report I received was highly satisfactory, and fully bore out my opinion that wines of low alcoholic strength will carry safely, and, if well made, will improve on the voyage.

## The Local Market.

While I have been at some pains to expose the faults of the trade in Australian wines in England, it were only justice to draw attention to some of the evils in connection with our home trade. Complaints are frequently made that the market is flooded with young and immature wines, and those who earnestly desire that the industry should prosper, view with regret the practices which so largely obtain. The production is yearly becoming more in excess of the local demand, consequently growers who have not turned their attention to exporting or selling direct to the consumer find a greater difficulty in disposing of their produce, and in the competition prices are lowered to the finest possible margin of profit. At times it is even difficult to sell wines, no matter how low the prices asked. The condition of our market to-day also stands in need of reform, and largely fosters the sale of wines that certainly tend to lower the prestige of the trade. Many of the arguments respecting the formation of a company (hereinafter dealt with) to govern the exports would aptly apply to the home trade. Growers, many of them, must sell their young wines, having neither the casks nor cellarage accommodation for storing two or three years' vintages. The time is most opportune for the formation of a company in this country to purchase young wines, and prepare them for the market. So soon as this is done we may anticipate very much better results to all concerned.

## Type of Wine Suited for the English Market.

I have elsewhere stated that the wines at present having the greatest and readiest sale in the English market are mostly full, heavy, coarse, young, red wines, of great body and alcoholic strength, and of a fruity character. The type of wine is easier handled than the finer and more delicate wines, and gives the merchants but very little bother, and on this account is, no doubt, much encouraged. Many of these wines are of most excellent character and quality, and would compare favourably with the best wines of the world in their class when matured. Still, though there is a large demand for them, the class of people who purchase and consume them are not connoisseurs, nor are they looked upon as wine drinkers. Their idea of a good wine is one possessing good body and strength, delicacy of character and bouquet not being included in their reckoning. The merchants have, in a measure, created a demand for these types of wines only, and the wealthier classes of society, who consume large quantities of the rarest and finest wines, have had no proper opportunity of learning that Australia could produce a vintage equal to that of some of the finest Bordeaux or Rhine wines. I maintain that the higher quality of fine, light, delicate, dry wines, with a richness of bouquet such as many districts in Australia are capable of producing, are the kinds of wine we must look forward to for establishing a name and fame for our produce. These are the types of wines drunk by the wealthier classes and connoisseurs, who can appreciate their rare qualities, and it is only necessary to properly introduce these wines to secure a ready and unlimited market for them. Growers who have been devoting most of their attention to this class of wine need not get discouraged because there is no great sale for them at present, for so soon as supplies increase, and the qualities become known, they will find their efforts in that direction amply rewarded. English buyers, having built up their businesses on other wines, have but little sale for the higher and more delicate style of wines, but the time is near at hand when they will be compelled to give more attention to this branch of the trade. So soon as our best growths of white and red wines, of low alcoholic strength, find their way into the market their very excellence will soon make them widely known; merchants will see that a better class of trade is to be done than they have been accustomed to, speedy reforms will follow, and a constant and profitable market will be assured. I do not wish to imply anything disparaging of the full-bodied good red wines at present shipped, as I know they are the wines mostly sold in large quantities in connection with the Australian wine trade in England. The chief buyers ask for these full luscious fruity wines, which will continue to command large and increasing sales for many years and grow into favour, more especially if they obtain the opportunity of maturing in the merchants' cellars instead of being sent into consumption while in a green state, or used, as they undoubtedly are in many cases, for dyeing and disguising purposes, or what the merchant incorrectly terms "blending." In the wine trade there is an evolution at work that promises well for the Australian grower. Provided he pays careful heed that none but really sound well-fermented wines are shipped, an enormous market will be opened up to us, and our supplies, so soon as they are ripe for shipment, will be absorbed at paying prices, so that we need have no fear on the score of over-production and a glutted market. Much depends upon our own efforts in order to achieve the consummation of our desires; there must be no halting or resting till the evils which now beset us are cleared away.

I would here reiterate that wines from Australia, when well made, and even of low alcoholic strength, say from 17 per cent. proof spirit, as well as the heavy alcoholic wines, when carefully made, improve to a wonderful extent on the voyage, and, if fined before shipping, will be found, after being allowed a week or fortnight's rest after arrival, in a highly satisfactory condition. This is the more encouraging, as statements to the contrary have been continually made, no doubt by interested persons, with the object of creating a feeling of discouragement, and preventing independent growers who purposed shipping from doing so.

I would also urge upon intending exporters the urgent necessity of seeing that all casks shipped are thoroughly cleansed and treated before being filled, in order to take out any taint of spirits they may contain or excess of tannin, and which is always present in new wood. It is highly essential that these and every other known precaution should be taken to prevent disappointments and complaints, and in order that success might follow.

In order to demonstrate what matured Australian wines were like to those who wished and had not had an opportunity of tasting them when direct from the grower, and not through the large merchants, when in England I distributed over 100 cases of wines of various kinds, bottled at my cellars, Great Western. My object was to prove that our wines would not only keep, but improve with age. I invited comparison with many of the best wines of the world, and I was thoroughly satisfied with the opinions expressed in regard to them by many gentlemen and merchants who up to the present have not entered into the trade. They assured me that if such wines could be shipped largely and regularly, and sent forward in the same condition and style, success and better prices would speedily follow. Further, I may say, these gentlemen were prepared to support their opinions by ordering quantities of the same kinds to be shipped from Australia, and thus prove the value of their judgment in a practical way. Mr. J. E. Fells, whom I have already mentioned, purchased the whole parcel of the bulk wine I had shipped, and who wrote to me as late as 22nd March, that although the quantity at the time, for him, was large, he had been so successful in attracting attention to the qualities of the wines, which were highly esteemed, and recommended themselves in sampling, that he asked me to forward him 40 hogsheads (about 2,500 gallons), by the next mail boat, of dry red and white wines, and another shipment later on. I only mention this in order to support my contention that if the right types are shipped, and good merchants have the handling of them, that the trade will prosper. I am also, by the same mail (22nd March, 1892), in receipt of a letter from Mr. E. Russell Budden, consulting technical chemist, London, and who analysed my wines on arrival, informing me that he looks forward to a great future for such wines as those I had shipped and submitted to him. He further expresses his opinion that the trade was injured at the outset by the introduction into the London market of inferior produce. "Time alone," he says, "can remedy this injury; but growers must take time by the forelock, and not allow things to drift, as at present." Such letters as these are encouraging, coming, as they do, from gentlemen with a knowledge of the trade, and knowing so much of the requirements of the English market; and strongly emphasises all I have said in regard to exercising the most careful heed that the wines leaving our shores are up to the required standard of excellence.

## How to Create Trade on a Sound Basis.

Numerous suggestions have been made as to the best means for expanding and placing the Australian wine trade on a broader and sounder basis. But, while there is a consensus of opinion as to the necessity for prompt action being taken, most regrettable apathy is displayed by those interested, who, while willing to take advantage of opportunities when presented to them, do not attempt to make opportunities for themselves, as they unquestionably should do, either individually or by co-operation with other growers and business men of standing. I have discussed this question with gentlemen in England filling high commercial positions, as well as others largely interested in the shipment of wines, and have come to the conclusion that the goal of our ambition might be the safest and easiest gained by the flotation of a strong company of (say) 100,000 shares of £2 each, and £100,000 called up, shares in which should be held by vignerons and others interested here and in England. There should be no difficulty in floating such a company if growers would come to a proper understanding and co-operate for the common good. Such a combination of producers would assure a regular supply of all grades of wines, and the company, when formed, would establish large cellars in Victoria as well as in the other colonies, in which to store their wines until they were sufficiently matured, and ship them only when they were ready for bottling to the principal depôt in England, so that they could go into immediate consumption. A better class of wines would speedily result, as they would be carefully and skilfully blended before shipment, and customers would be able then to confidently rely upon always receiving the same class and character of wines, which, as I have elsewhere stated, is impossible under existing circumstances. The company would absorb all the supplies which might come forward, and an outlet for surplus stocks would be at once provided. It would prove an inestimable boon for vignerons generally, as they would always have the knowledge that there was a market for their produce. One patent reason why the production of wines has not progressed as could have been desired is the cost of holding and storage. Small growers do not care to go to the expense necessary to provide cellars, vats, casks, and all the appurtenances essential to the production and storage of wine on a large scale for years when there is not an assured market. Many there are who would at this moment have had double the acreage they now possess under vines had they been able to dispose of their young wines. If a company was formed on the lines suggested these difficulties would be overcome, and the production of wines would increase marvellously. Hitherto overmuch attention has been paid to the London merchants, Australian exporters overlooking the fact that there are a number of large centres in the United Kingdom with each of which a trade might be opened up independent altogether of the great metropolis. If the wines, on arrival at the central depôt in England, were subjected to careful treatment I have no doubt that an enormous trade would speedily follow. Larger profits would accrue to all concerned if the company was conducted on sound business lines, and higher prices would prevail throughout Australia for wines, and vignerons would be encouraged to pay more attention to their vineyards and cellars, and the result would be the output of much better wines than at present, and which, I am assured, would drive many of the inferior vintages, which have large sales, out of the market. In order that the company might be successful, co-operation among large and small growers would be necessary. The company might enter into an understanding to purchase all their surplus stocks, after

the local demand had been satisfied, at a price to be mutually agreed upon, for a lengthy and specified term of years. The company would then start with an enormous advantage over any house in the Australian wine trade, as in the first instance it would have a large stock to commence with of matured wines which could be purchased under agreement, and after preliminaries were arranged, could be shipped for immediate sale in Great Britain. From these sales profits would accrue at once. In fact, with such a combination, the company would be practically floated as a going concern, and with a tied area of vineyards in bearing of probably 7,000 acres in Victoria, South Australia, and New South Wales, secured for a term of years, and which would represent at least 200 gallons per acre; the company would have command of 1,400,000 gallons of wine per annum. If the company prospered, as it undoubtedly should if equitable and sensible agreements were entered into with the producers, I do not hesitate to say that in a few years, if it was required, the tied area of production could be doubled, and the assured supply total up to the handsome amount of fully 3,000,000 gallons per annum, and which could be even still further increased as demands for our wines in other markets were created. There is much food for reflection in this both for growers and commercial men, offering as it does a wide field for investment, probable large profits, and the constant employment and settlement on the soil of many thousands of our population. The subject has a political importance also that should not be over-looked. It would assist the Governments of the various colonies in meeting the oft-recurring crises in the labour market; it would help materially to swell the revenues, and add largely to the general prosperity of the whole of Australia.

I am willing at any time to assist in the formation of a company on lines somewhat similar to what I have briefly sketched, as I am firmly convinced that it is absolutely necessary that something of this kind should be undertaken, and as soon as possible, to further an industry which promises so much for Australia, and which otherwise will fail to fulfil the magnificent promises of its first inception.

None of the old-established wine merchants on a large scale in the Australian wine trade in England hold, nor, judging by the lines they are working on, do they intend holding, sufficient stocks, as the wines now shipped to England, whether one-year old or five, make no difference; if they can be sold they will on arrival. In some instances they are sent out in bottle direct to the consumer within a month of their being landed in London. Large wine merchants in England insist that the Australian growers should hold stocks until matured; but even if growers could do so the merchants would not give a sufficient increase per gallon to permit of the storage till matured; and, as is well known, the grower does not, speaking generally, want to act in both capacities, but if he can sell readily at fair prices, he prefers to dispose of his young wines; but he expects that the merchant will store them till matured before placing them on the market, which, from my experience, the merchant seldom does. Growers all the world over invariably sell their vintages yearly, and the merchant stores them, or should do so, until they are sufficiently advanced for shipment or for bottling. This is the only practice followed by good merchants who wish to maintain a character and reputation for their houses. But there are others whose greed urges them to practices which disgust the public and brings the Australian trade into contempt. To such an extent have some of the merchants by their haste to make money succeeded in depopularising Australian wines amongst the wealthier classes in England, that in no single instance did I hear of or come across Australian wines at any gentleman's

table during the few months I was in England. I maintain that the better class trade has never been tried or attempted to be opened up on proper lines, and that there is an immense market awaiting development. Such success as Australian wines enjoy in England to-day is due almost solely to an extensive system of advertising. But trade built on a basis of this sort without being flanked by some merit, will enjoy but a brief prosperity; and for the general weal of Australia I should rejoice to see such a scheme as I have suggested brought to a consummation, for then I should feel satisfied that viticulture would progress rapidly and soundly, and that permanent and steady prosperity would reward the efforts put forth.

## New fields for Australian Wines.

The question has frequently been asked—"How is it that those engaged in the Australian wine trade devote so much of thought and attention to the English market and its requirements and so little to other countries?" There are, in the opinion of many people who have given this subject earnest attention, many new and important fields awaiting development. China has been frequently spoken of as a probable good market for Australian wines, and the value of the outlet to viticulture in these colonies would be considerable. India and Japan promise to become valuable markets also, so that there is no reason for Australian vignerons to fear that outlets will not be found for the increased production. Up to this time the wine trade of Australia has been slumbering, but the time has arrived when it must shake off its drowsiness and enter vigorously into the work which has been neglected too long already. Not only does an enormous future await us with the countries named, but various parts of Europe and even France—the cradle of viticulture—promises to become a customer for our finer light wines, such as are suitable for blending for champagne; for, notwithstanding expressed opinions to the contrary, I am confident that in several districts of Australia champagne wines can be produced that will compare favourably with the best champagne wines in the world. Such being the case, if these wines were properly introduced to France, and regular supplies were warranted, I am of opinion that a good business could be done. Germany presents a good field for the introduction of our white wines and wines of a full-bodied Burgundy type. I simply touch upon this aspect of the export question to show that we are as yet but on the threshold of the industry, and that we are unable to conceive what expansion it is possible to attain to. Growers and shippers need only bestir themselves a little to open up channels that would absorb all the wines Australia could produce. India, if properly looked after, promises to become a very large market; and as there need be no fear of sufficient supplies of the kinds of wines required not coming forward in the future, as the increased areas of vines planted, and which will be annually coming into bearing, will keep pace with the increased demand, that country should receive careful study and attention, and good results would be sure to follow.

## Wine Casks.

Now that the export trade in wines bids fair to become of great importance to Australian vignerons, there is one matter that should receive careful consideration. One of the costliest items in viticulture is, without doubt, that of providing casks, and I would take this opportunity of saying that persons shipping wine should be permitted to import casks suitable for wine free, in place of, and to the number of, the casks exported. That is to say, if a wine-grower ships 50 hogsheads, containing wine, to London, that he

should be allowed to import 50 hogsheads, either new or second-hand, duty free. It is a well known fact that the casks exported from this country to London are distributed to various parts of Great Britain, and that it is impossible almost for them to be again collected and returned to the shipper. The law of Victoria, passed for the protection of coopers and cask-makers, which provides that all new and second-hand casks imported have to pay an *ad valorem* duty of 25 per cent., oftentimes proves a serious hardship to growers, while the provision that where it can be proved that any second-hand casks are returned empties, sent out so that they can be used again in the export trade, a rebate can be claimed, is as a dead letter. The expenses incidental to obtaining the Government stamp on the staves of the cask, and the verification of the marks by the Customs authorities, makes it very doubtful whether it is a saving to claim drawback at all, as for small consignments Customs charges absorb the whole amount, or nearly so. The plan I have suggested would not interfere in the least with the protection afforded to coopers, for it would only be equal to receiving what had been sent away, without being hampered as at present with the Customs. The matter is so important that I would urge the various Vine-growers' Associations of the colony to bring it forcibly under the notice of the Government, and to enlist the sympathies of their representatives in Parliament in the movement, which, if successful, would remove yet another hindrance from the path of progress. There is another phase of the question that should be borne in mind. While there is an *ad valorem* duty of 25 per cent. on casks and staves imported into this colony, staves are admitted duty free into South Australia, and in New South Wales there is no tax on either cask or staves. From this it will be seen that the Victorian vigneron is put into an uneven competition in the trade with England, even with his neighbours. How this can be reconciled with a professed policy of fostering the industry baffles comprehension, and I trust that the handicap will be removed as soon as possible, in order that the export trade may be facilitated.

## Value of Exhibitions.

The value of exhibitions was clearly shown by that held in London in 1885–6. Up to that time Australian wines had received but scant attention from the merchants and connoisseurs, and in despite of the best efforts of the exporters the indifference and apathy which existed could not be removed. The knowledge of what kind of wines Australia could produce was first practically and effectively conveyed to the British public on this occasion. and was brought prominently under my notice while in England. High encomiums were passed upon several of our vintages by experts and gentlemen possessing a wide experience and unchallengeable judgment, and the popular verdict was that if wines of such a character as many exhibited and sold during the exhibition were shipped from Australia in any quantity, and further supplies of the same grade could be relied upon, the wines had a great future before them, and commercial relations with the United Kingdom, as well as with other countries, were capable of a wonderful extension. Proper advantage of the opportunities has certainly not been taken as yet, but the time is now ripe for growers to assert their position and go in for improvement.

The Centennial Exhibition held in Melbourne, 1888–9, lent a still further impetus to the industry, the value of which it would be impossible to estimate. Not only were Australian wines introduced for the first time to thousands of our own people, but direct buyers were brought from England. Prior to the holding of this exhibition but little was known among the general public of our wines, and it was therefore a splendid means

of disseminating a knowledge of the capabilities of the country among all classes of the community.

Knowing what good results have followed from the exhibitions hitherto, it is much to be desired that Australian wines will find a prominent place in the World's Fair to be held in Chicago next year. The time for the closing of entries is now near at hand, and much anxiety is felt by those who have the interest of the industry at heart lest the Government should allow the opportunity to pass without taking advantage of it. The western states of America are making a big bid to secure popularity for their wines in England, and if Victoria fails to have her wines represented at Chicago it may be taken as granted that the enterprising Americans will secure an advantage over Australians, in that they will make their wines known to thousands upon thousands of visitors from Great Britain and the world at large, the majority of whom, perhaps, have but the vaguest idea that Australia is a a wine-producing country at all. The opportunity is one that should be seized promptly by the Governments of the various colonies. The Victorian Government, in pursuance of its policy to encourage the growth of the vine, should not allow such an opportunity as is here presented to pass for making known to the world the capabilities of the country for producing high-class wines without availing itself of it to the fullest possible extent. The financial condition of the colony may not warrant the expenditure of a large sum of money in this enterprise, but something ought to be done to keep the colony to the fore, as it means the increase of an industry of immense importance to the State, the development of other fields, and the introduction of capital which can be well invested, and which would speedily be creative of much labour. We have proved the value of the Indian and Colonial Exhibition, as well as the Centennial Exhibition, as an advertisement for the Australian wine trade, and have found that a large and growing trade has resulted. The Chicago Exhibition will be the largest the world has ever known, and I venture to say that a good representation of Australian wines would be productive of great benefits in attracting population to our shores, drawing attention to our resources, and assisting to open up new and valuable markets.

## Viticultural Colleges.

Viticulture in Australia has arrived at a stage in its advancement whence it becomes absolutely necessary to take every conceivable precaution in order that it may suffer no check. Our wines, from this time forward, will enter into serious competition with the produce of European countries, and if success is to crown our efforts we must be prepared to avail ourselves of all the information collected by scientific research, as also to take advantage so far as possible of the accumulated experience of those with whom we shall be called upon to compete. Wine-making forms the most important industry of France, and it is at once instructive and pleasurable to study the means by which it is fostered by the Government. To M. Mathieu de Dombasle belongs the honour of founding L'Ecole de Roville in 1822, which was practically the first institution established in France for the purpose of imparting scientific and practical knowledge in agriculture. From that time forward immense strides have been made in the direction indicated, and the establishment of L'Ecole Nationale d'Agriculture de Montpellier (1872), marks an epoch in the history of agriculture in France. The curriculum of the school embraces agriculture, horticulture, botany, forestry, chemistry, mineralogy, geology, meteorology, silk culture, technology, viticulture, zoology, and entomology. The course of viticulture is remarkably comprehensive, embracing, as it does, the study of the anatomy of the vine—

flowers, leaves, seeds, and stock. Special attention is devoted to the characteristics of the seeds, &c., of the various species of the vine, and pupils are expected to know the names of the vines mostly cultivated by their seed. Hybridisation of vines is practically studied. A special feature in the studies of the pupils is that after they have made themselves acquainted with the structure and habits of the vines they are conducted by the professors over the vineyards connected with the school, in which almost every vine in the world is to be found, and they thus become acquainted with every kind of vine in practical form; they see it grow, learn how to prune it, and the results of the various systems adopted. Excursions are occasionally made over the vineyards in the neighbouring country, and by this means the students are familiarised with the various forms of cultivation. The first term is occupied in acquiring an elementary knowledge of the various subjects to be studied, and afterwards they are introduced to more complex and intricate matters pertaining to pruning, grafting, laying out vineyards, the diseases which attack the vine and the remedies. Careful attention is allotted to phylloxera, and the various types of American vines are subjected to careful scrutiny; M. Foëx, the curator of the viticulture department of the school, having for many years past allotted himself to the investigation of the causes of resistance offered by the American vines to phylloxera, He has already acquired upwards of 400 different types of these vines, and the world is indebted to him for much valuable knowledge on this subject. From what I have said, it will be seen that not only does the school offer magnificent facilities for persons to acquire a thorough knowledge of viticulture, but an increasing inquiry is being made into the laws which produce the effects with which we are already familiar. The instruction imparted to students embraces everything, from the laying out of the vineyard to the final treatment of the vine; and as the school is largely patronised, it may be readily understood that French vignerons are in a much better position than we are in this country in being able to obtain thoroughly competent men. I had also the pleasure of visiting the School of Viticulture at Conegliano, Italy, with which I was much impressed. Everything in connection with this institution is so complete—the instruction given to students is so thorough—that I am inclined to think that it holds the foremost position among similar establishments in the world. Unlike Montpellier, viticulture is studied at Conegliano to the exclusion of allied industries, and to it is largely due the awakening prosperity which is cheering the hearts of Italian vignerons to-day, as well as assisting materially to build up the revenues. The faults in the Italian wine trade, which at one time threatened to almost totally overthrow it, are being rapidly removed; and the Italian Government has been quick to perceive the national importance of a school where those interested in wine-making may learn all that is necessary to profitably and successfully produce a good and marketable article. If, then, the two schools of viticulture I have mentioned are doing such excellent work in Europe, surely there is urgent necessity for the founding of a similar institution in this country, where many of those engaged in the wine-growing are novitiates, possessing at best but a rudimentary knowledge of the processes involved therein. As the industry grows the want will be more and more accentuated, and the loss, I am inclined to think, which will result from ignorance, will soon be greater than that of founding a school on the lines indicated. Such are the proportions which viticulture has already assumed in this country that careful heed should be given to provide proper outlets for the wine produced. The Government by its offer of liberal bonuses to encourage vine-planting has

committed itself to the task of placing the wine-growing industry on a firm and satisfactory basis, and unless provision is made for disposing of the increased supplies the State policy will prove a serious injustice to the older pioneer vignerons, who, unaided, have succeeded in overcoming the many difficulties that confronted them, by encouraging others to enter into competition with them. The wines produced in Victoria, as well as most parts of Australia, that have been proved, are of such a quality that if they are properly treated will command a market without much difficulty. But it is well known that there are a great many people engaged in the industry who do not understand how the wines should be made, and to such the founding of an experimental school on the lines of Montpellier or Conegliano would be an immense advantage. Lack of experience in fermentation and other essential matters has, without doubt, much to do with the low prices ruling for many wines shipped, as well as other causes referred to. But once a sound knowledge of the growth of the vine and the manufacture of wine is practically obtainable, and the necessary information is disseminated amongst growers, all this will be altered, and Australia will have no need to fear competition with any other country. One important result of the establishment of a viticultural college would be that expert labour would soon be available, and vignerons taking advantage of this would find their wines assuming a better position in the market, and, what is of importance also, their vineyards and cellars would be better and more economically managed. The advantage of such a school would soon be recognised, and in all likelihood would be self-supporting, as not only would there be the fees of the students to rely upon, but after a time the vineyard belonging to the institution would be a source of profit, and more particularly as the practical training given would necessitate the performance of a great part of the work by the students, who pay liberally for the privilege of doing it. The proportions of viticulture are becoming so great, and its importance, from an industrial point of view, so generally recognised, that the State would earn the thanks of the whole community if it established colleges that would render the accomplishment of these things possible. There is one other matter that the Government might undertake with a certainty that the act would be fully appreciated. Up to the present the efforts put forth to instruct vignerons in the kindred subjects of wine-growing and wine-making, by the establishment of a Board of Viticulture and the employment of experts, have proved in a great measure abortive; certainly no benefits commensurable with the expense has resulted. The visits of the experts in the service of the Department of Viticulture have in many cases been paid at times when it is impossible to impart any really practical information, and, moreover, the visits have been of such a short duration—flying visits, so to speak—that what good might have been done was but partially accomplished. I am conscious of the fact that valuable service has on occasions been rendered by the experts, particularly to intending planters, as well as in cellar work and the treatment of wines. The system errs in that it falls short in its mission. Young vignerons stand in sore need of advice and counsel during the vintage, as also during the pruning and disbudding season.

If distinct experimental schools were founded, and in connection with these were thoroughly trained and capable experts, whose services could be readily availed of in practical form during those seasons, so as to clearly demonstrate what was required to be done, and how best to do it, an immense good would result, and the industry would be relieved of much that has a tendency to retard its progress to-day.

## Phylloxera.

Volumes might be written of the ravages of the phylloxera pest, and, bearing in mind the devastation which it has caused in Europe and in this country, the importance of understanding how to cope with it is of the highest importance. The phylloxera, it has been satisfactorily ascertained, came originally from the United States, where it was first discovered in 1854 by Mr Asa Fitch upon some vines in the State of New York. In 1869, M. J. Lichtenstein, of Montpellier, first hazarded the opinion that the phylloxera, which was attracting much attention in Europe, was identical with the American leaf-gall louse. This opinion was afterwards fully affirmed by several scientists who devoted great attention to the subject. It was not until 1863 that the disease began to develop any very alarming symptom, but such has been the alarming increase since that time that M. François Bernard calculated that vineyards in France covering 1,000,000 hectares (2,470,000 acres) have been totally destroyed by it, and that 200,000 hectares (494,000 acres) in addition are doomed to a like fate. Various specifics have been used to check the inroads of the scourge, chief among which has been the planting of American vines or American stocks, on which are grafted the French vines. These measures have been attended with some success, as the wine crop, which, from an average of 1,200,000,000 gallons prior to the advent of the phylloxera, had fallen to 600,000,000 gallons in 1885, rose to 800,000,000 gallons in 1889. Generally throughout France reconstitution of the old vineyards is rapidly increasing, and, if it continues, in a very short time France will have a greater extent of land under vine cultivation than it has ever had. In 1888 the American vine, for purposes of grafting, had been planted in 22,260 acres only. This had increased in 1889 to nearly 750,000 acres. The vigorous and ligneous roots of certain varieties of the American grape vines have been found impervious to the attacks of the insect, and have flourished in vineyards where all the other vines perished. There is no longer any doubt that phylloxera is indigenous to America, but strange to relate, although found on the wild vines, it is very doubtful if such wild vines in a state of nature are ever killed by it. There is a lurking fear in the minds of French peasant proprietors that, although the vineyards which may be reconstructed in the manner stated would give an increased yield, the quality would be inferior; but I consider that the quality will be equally as good as from the old Bordeaux stocks. In the champagne region where the phylloxera has made its appearance strenuous opposition is shown to any of the methods named, the smaller growers contending that if American plants are introduced there can be no more "French champagne." From the mass of evidence which has been collected on this subject it appears to be conclusively proved that in the phylloxera-resisting vine the world has a remedy for the scourge which at one time threatened to ruin an industry which, in France at any rate, would be a most fearful catastrophe. I need not do more than make the merest mention of the precautions taken in Victoria to combat the disease, but it would seem that the experiences in Europe point a moral which it would be well for us to take to heart. I would suggest that the Government should establish a vineyard or nursery in some isolated position of the varieties of American vines known to be phylloxera-resisting from seeds. This could be considered and managed as an adjunct to the college which I earnestly hope will soon be established. In the event of the pest again making its appearance vignerons would have the satisfaction of knowing that they could obtain rooted vines or cuttings of the kind referred to to replace those destroyed. In the vineyards connected with the school of Montpellier I was

shown vines literally covered with phylloxera, and yet they were thriving well and gave no indications that they suffered at all so far as the yields of grapes were concerned. I would urge, in view of the widespread ruin and the check the industry would receive if ever phylloxera appeared again on a large scale, that pressure should be brought to bear on the New South Wales Government to take immediate and more urgent measures to uproot and destroy all vines in the district affected in that Colony, and that it should be quarantined for a number of years until it was proved beyond doubt that the disease existed there no longer. If the same practical measure had been resorted to as was the case in Victoria the dreaded disease would not exist in New South Wales to cause alarm in the minds of growers generally as it does to-day.

## Scarcity of Competent Labour.

The necessity of employing competent labour in our vineyards and cellars is pressing with greater weight upon vignerons to-day than on any previous occasion. The old notion has been exploded that any class of labour is good enough for gathering the vintage and converting the grape juice into wine. Those expert in wine-making are cognisant of the fact that the real work commences when once the wine enters the cellar. After fermentation comes the processes of racking, fining, and blending—all of them matters that the ordinary labourer could not be made to understand without a wonderful deal of trouble and probable loss. Successful wine-making depends upon the careful, cleanly, and skilled performance of every detail connected with it. The scarcity of competent labour gives emphasis to the necessity of establishing colleges or experimental schools, where our youths might receive a theoretical and practical training in vineyard and cellar work. A knowledge of the rudiments of chemistry, if not a qualification absolutely necessary to those engaged in the production of wines, is at least most useful, and assists the possessor to more intelligently discharge the multifarious duties connected therewith. Competition in wines, as in most other things nowadays, is keen, and therefore, in order to command success, in addition to quantity it is essential to have quality also. It is not affirming more than is absolutely the truth when it is asserted that Australia will, in the course of time, be in a position to supply wines the quality of which must command attention even when compared with some of the rarest vintages of the most famous vineyards of Europe. The delicacy of bouquet and excellent character of many Australian red and white wines when brought under the notice of acknowledged connoisseurs had come as a revelation to them. Growers are becoming more expert in handling their wines, and in developing the latent features which they are known to possess; but the difficulty, as stated, is to obtain the services of men who have a sound knowledge of the wines, and who understand the treatment which various sorts of wines should receive in order that they may develop the characteristics that constitute their real value. An aptitude in Australian growers to learn, and a ruling and anxious desire to understand the secrets of wine-making has been productive of much good, and to these causes may be attributed that modicum of success which has recently attended their efforts; but we have much yet to learn before we can expect to attain that degree of excellence enjoyed by old continental growers.

## Grape Brandy.

I have dealt at considerable length with the urgent necessity of purging the wine trade of the vicious practices which so very largely exist, and, while I have emphasized the disastrous effects produced in England, I am aware

that matters are not as they should be at home. Strenuous measures are urgently needed to prevent the shipment of bad or inferior wines, otherwise all hopes of the successful establishment of a large trade with Great Britain will be doomed to disappointment or, at all events, unnecessarily delayed. Such wines as were considered unfit or unsuited for shipment could be profitably utilised for distillation.

Sufficient attention has not been given to the manufacture of grape brandy, and I most heartily concur with those who affirm that this is an auxiliary of viticulture that will eventually become very important. Messrs. Joshua Brothers, at their Port Melbourne distillery, have successfully demonstrated the practicability of establishing a large export trade in brandy. Samples of their brandy submitted to experts have been highly spoken of, and the firm has been moderately successful in finding a market outside the Colony. A very wise policy was adopted by this firm in the initial stage of their export trade, viz., they determined that all casks exported should be branded "Victorian Vineyards Brandy," so that the English trade and consumers might be informed from whence the brandy came. That the successful establishment of this industry will prove an immeasurable boon to viticulturists it is needless for me to say. But the aspect of the question to which I would draw particular attention is that wines which might be condemned, once a proper system of supervision is established, could be utilized for distillation. The grower would receive a fair price for his produce, whereas if he were allowed to ship it it would assist in bringing the wine trade still further into disrepute, and would tend to lower the prestige of Australia as a wine-producing country in the minds of the British public. The decadence in the production of grape brandy is universally regretted. The demand for some time past has been in excess of the supply, and I am strongly of opinion that the time is most opportune for Australia to come forward and make a bid for success. However considered it seems to me that brandy-making should become one of the most important adjuncts to what has already become a most powerful factor in the employment of labour and the production of wealth in these latitudes.

It must not be forgotten that many interested parties in England are jealous of our being able to produce wine at all, and are ready at all times to decry the produce of Australia. This is an additional reason why we should be careful to ship no wines that are likely to afford an opportunity to our would-be detractors. I am aware that faulty wines have gone forward from this country to large merchants in England, who buy at distillation prices for the purpose of supplying what they call their cheap wine trade, and it is this class of trade chiefly that serves to bring Australian wines into contempt amongst the English consumers. If distilleries were firmly established here the wines referred to would command good values for distillation, and the credit of the Colony would be saved. Until that time arrives the grower will continue to sell for what he can obtain to any one willing to buy, regardless altogether of consequences. It is the type of wine in question which is to be found in all parts of Great Britain. They have probably been "restored" in the manner I have already described; but they are a standing disgrace to the colonies, and incalculably hurtful to the better class of trade we wish to see established. Once distilleries are properly started in this country the loss resulting from the shipment of inferior or bad wines will be reduced to the minimum, and thereafter the English merchants will be compelled to have resort to other and, I trust, better measures, and buy and sell only good wines of such a type that it will redound to our credit, and restore and create a confidence that will thenceforward guarantee a good and lucrative market.

# The Export of Fruit.

ADVICES received by the Department show that the London fruit merchants still maintain a lively interest in the question of exporting fruit from Australia. At the suggestion of the Department several firms have expressed their willingness to forward sample consignments to illustrate the systems of packing adopted in Europe, and more particularly the mode of packing grapes shipped from Spain. Arrangements were also made to obtain the latest hints as to the conditions of the English markets.

With reference to packing, Messrs. Knill and Grant, of London, forwarded per "Orotava" a barrel of grapes which had been shipped from Almeria in Spain in the beginning of October, leaving England as above mentioned on 3rd November, 1892. Special arrangements were made to have the grapes kept in a temperature of 40–45 degrees throughout the voyage to Sydney. The following report by Mr. George Valder, in whose charge the Departmental cold storage experiments have been placed, shows the result of the shipment:—

"The barrel of grapes was received by the Department on Friday, the 23rd December last. It was taken down to the Country Milk Company's stores, and was stored in the butter chamber (over the holiday period) until the following Wednesday; during this time the chamber was kept at an average temperature of 41 degrees Fahr. The barrel was then opened at the offices of the Department, and on examination the following particulars were observed. The grapes were open to public inspection on Wednesday, Thursday, and Friday, the 28th, 29th, and 30th December last:—

"The barrel is what is known on the London fruit market as a 'half-barrel.' It measures 16 inches deep, is 15 inches in diameter at the top and bottom, and 16 inches in diameter in the middle. When packed it holds about 50 lb. of grapes. The staves are made of well-seasoned wood, and they fit very closely together, in fact, when full, the barrel is almost air-tight. The hoops are made of wood, and are similar to those used for the barrels in which currants are packed.

"The cork-dust in which the grapes were packed is rather a coarse sample, but from its light spongy nature, and freedom from dust, it is evidently very suitable for packing this class of fruit. The cork-dust was freely shaken between the berries, and the whole then firmly pressed down, and yet the total weight of cork-dust used in the barrel was only 5 lb. 10 oz.

"In the London and other European fruit markets I have often examined consignments of Spanish grapes, and in comparison with those shipments I should say that the present sample is only a very ordinary one of the Almeria grape.

"The grape is white, rather coarse, with a very tough skin, and the berries are very free on the bunch. Many of the bunches had evidently been cut before the fruit was quite ripe, and as a consequence it was found that the stems were quite rotten. In other bunches, which had been cut when the

fruit was ripe, the stems were quite dry and wiry. The condition of the fruit was, on the whole, very satisfactory, as the berries were quite plump and fresh, and less than one per cent. of them had rotted. It was found that where a berry had rotted the moisture had been absorbed by the cork, and on examination of a number of the berries adjoining those that had rotted they proved to be perfectly sound."

The following "latest hints as to markets" were kindly forwarded by Messrs. W. N. White & Co., of Covent Garden, London, dated 11th November, 1892, to whom Australian fruit-growers are greatly indebted for advice and assistance :—

"The outlook for your apples during the coming season is much better than it was a month ago, for we were then under the impression that America and Canada had very large crops, and that owing to the extent of those crops they would be able to send their goods here till late in the season. We have reason now to alter that impression, as, notwithstanding the large supplies in Canada (some 3,000,000 barrels, or 9,000,000 bushels), shipments will not be great, as the fruit has become more or less wormy, in consequence, we believe, of the trees not being washed so much this season as they have been other seasons, and so will not keep. So on this we take it, there will be a good opening for your country after the middle of January next.

"We understand that a large lot of cork-dust has been shipped to your place this season for the packing of grapes to come forward to this country next year. We ourselves have shipped some to the Cape. Prices are equal to £6 per ton, f.o.b., Lisbon. The dust is packed by hydraulic pressure into bales, in order to reduce the size. We do not think that barrels would be of any use to send to your country for packing grapes in, as we take it that small packages of about 20 lb. would realise more money here than barrels, because both small and large customers purchase them more readily than they do the barrels, as they are more useful. Again, small packages do not take up so much room in the refrigerating chamber as barrels, as they can be conveyed at per ton measurement. All these things must be taken into account.

"In packing grapes in these cases, care should be taken that not a single berry touches the wood. Not only should sufficient dust be placed *around* the grapes to keep the berries away from the wood, but, if possible, *the dust should be well shaken into the bunches*, so as to keep the berries from touching one another. If this advice be followed, the bunches will arrive here in thoroughly sound condition, with the berries unbroken.

"In conclusion, we may remark (and this perhaps is the most important) that *the grape should be sufficiently seasoned when cut*, so that on arrival here the stem is in a wiry condition. If cut green, the stem rots, in consequence of the flow of sap to the berry; and if cut too ripe, the grape, on arrival here, will fall off the bunch. You will see from this that your people have to consider two things:

(1) The packing of the grape.
(2) The time of cutting the same.

"These are most important, and should be well looked after."

# Poultry.

## Fowls on the Farm.

*From the Melbourne Leader, 30th July, 1892.*
[By "our Agricultural Reporter".]

In one's talk with the average farmer you find it difficult to "get him down," as he considers it, to any serious consideration of the smaller products of his industry, such as, for example, the keeping of fowls in a systematic way as an important adjunct of farming operations. There is nothing surer, however, than that farming does not pay by confining the operations to one leading line of production, but by a well ordered combination of a number of what separately may be called minor things, but which collectively amount to important contributors in connection with the general annual revenue. Amongst these nothing pays better, when properly looked after, than the poultry on the farm. Take, for example, eggs at their present price in the aspect of their money value to those who have them to sell. No doubt it is a fact that eggs are scarce in the winter, but that is one of the matters for arrangement and management so as to have a supply at a time when they are so valuable; just as the dairyman who can put fresh butter on the market at a time when others cannot is the man who gets the advantage of the high prices and makes money. The export trade in butter has opened a remunerative outlet for that commodity at the season when we have a glut here; and the fact that our glut period is the season of scarcity at the antipodes happens advantageously for us. We have yet, however, to go further forward, and so manage, by timely green fodder crops, and by ensilage, together with a necessary ordering of the milking herd, to have a regular supply of milk all the year round. And so with the management of the poultry. When it is remembered that the United Kingdom has to have her home supply of eggs supplemented by importations amounting to £3,000,000 worth annually, and that our glut period is the season when eggs are as dear in London as they are here now, it will be seen that an important trade presents itself in this direction, after we have succeeded in meeting our own home demand. We cannot, however, so far, supply our own requirements, as last year, notwithstanding an import duty in our favour of 2d. per dozen, eggs to the value of £23,000 had to be imported from the adjoining colonies.

There are a few places in the Colony where poultry are raised as a special business, but it is as a portion of general farm management that the keeping of fowls ought to have a distinct place. As a general rule the fowls on the farm are reckoned as an unimportant affair, and in no direction is it so difficult to ascertain, with any degree of definiteness, what are the monetary results. In the older countries, where these subsidiary items of management are given careful attention to, you can get the farmer to figure on them, and

no doubt the time will come when the importance of these smaller, but none the less important, contributory agencies of the farmer's establishment will receive their proper consideration here also. Speaking at a recent farmers' conference in Canada, one farmer who had discovered how much money there was in fowls said: "It is one of the few products of the farm from which the farmer can at all times realise some ready money. It is the only investment known to the small capitalist that will pay him up to 500 per cent. on his outlay, and not ruin him if he loses his entire stock. It is the only pleasant and profitable occupation that can be engaged in by man or woman alike with equal chances of success. Few people realise the enormity of the demand. It is an industry that is yet in its infancy. The supply cannot easily exceed the demand." Another of the speakers said: "Farmers as a class do not give any special attention to poultry raising, ignoring it as of no consequence, and rather beneath their dignity as freeholders, while it has been demonstrated by practical men in our own neighbourhood that there is more profit in a flock of 100 fowls properly handled than in 100 acres of grain at average prices. Jas. Rankin, who began as a farmer, but is now solely engaged in the poultry business, claims a profit of 28s. per fowl with the aid of his incubators. Mr. Thos. Graham asserts that he has made more money out of 200 hens than he did out of ten cows; while in some of the mountainous counties there are many farms on which people are toiling year after year to gain a living from unproductive soil, while such farms have every advantage for successfully growing ducks, geese, turkeys, and chickens." It may be said that in relation to the average Victorian agriculturist, poultry occupies the position of an undeveloped source of income. It may be safely asserted that nothing about the farm will, with proper management, return so large a profit. It is a department that will utilise what otherwise would be waste, and give a remunerative return for it, representing as it does first, the egg, which is always as good as cash when required; second, the young, which are revenue producers in three to five months; third, the value as a meat product; and fourth, the value in producing the most valuable class of fertiliser. To enter elaborately into all the points connected with successful poultry management cannot, of course, be attempted within the bounds of a newspaper article, and the object is at present to direct attention to the value of the industry, so as to beget a desire for further details, and that being established, the supply of the needed information can follow as required. There may, however, be summarised a few leading conditions among the essentials to success.

With respect to house accommodation, elaborate and expensive buildings are not a necessity, so long as the requisites are met as to the fowls being kept dry, fairly warm, and well attended. A summary of leading rules would include:—(1) Do not inbreed; (2) supply the fowls, if closely confined, with what they are used to when running at large, such as gravel, lime, a dust-bath, and occasional supplies of green stuff; (3) keep no hens over two years, because after that age they moult so late as to eat the profit before they lay; (4) select the best kinds to breed from, and so secure a good laying strain; (5) watch closely for the hens that do not lay and have them killed; (6) save all table scraps and kitchen waste to be mixed into a hot morning meal; (7) keep the hens busy by scattering straw or leaves about their run, and throwing their grain feed into it, but do not feed too much; (8) learn how to manage the poultry department with as much care as any other part of the farm business, and keep a record of expenditure and receipts, so as to ascertain the amount of profit. Hens in confinement should not be too crowded. It is better to divide them into small groups,

the result of the best experience being that more money can be made out of twenty separated than double that number crowded. The average house space to a hen should be from 4 to 6 feet of floor space, and from 6 to 8 feet in height. The question is often asked by beginners in poultry-keeping as to what is the best food to give, and among those in Victoria, who make a specialty of the business, great stress is laid upon this important matter as an essential of success, so much so indeed, that many conserve their particular methods as secret to themselves. That food must have a great influence upon the health of the fowls goes, of course, without saying, and no doubt mistakes are made by those who do not consider the different conditions, as between fowls at liberty and in confinement. Fowls with a free run, live largely upon worms and slugs, and animal food may be taken with plenty of exercise, which would otherwise breed disease. Where eggs are to be produced, many elements are needed, chiefly albumen and oil, so that a well-balanced food is required, but for killing purposes it is best to supply food containing the flesh or fat forming constituents in largest proportion. Barley, one of the commonest grains given to poultry, is most suitable for rearing chickens, or for egg production, its fat and flesh forming constituents being in small proportion to those promoting warmth. Oats may be regarded as the best balanced of all the grains, while the husk forms about 20 per cent. of the whole, so that it is an excellent food for layers, if the oats and husks are bruised up together. Oatmeal, on the other hand, being devoid of the husk, is more suitable for fattening.

Wheat, containing as it does, 3 per cent. of fat, 12 per cent. of flesh forming, 2 per cent. of bone making, and 70 per cent. of warmth-giving properties, with very little husk, can be recommended as one of the best winter foods for general purposes, although it is not suitable for fattening. The small wheat or screenings is better suited for poultry food than the first-class quality of grain, owing to being richer in the flesh-forming matter. Maize is essentially a fattening food, and its exclusive use is apt to do harm by promoting internal fat to such an extent as to check laying, and if long continued, tends to induce disease of the internal organs and apoplexy. It is, however, an admirable fattening food, but when used for this purpose should be ground and swelled with scalding water, and fed in alternation with whole maize, or some other grain. It is very good for feeding whole to all kinds of poultry for the meal given late in the day, as it digests slowly and keeps them warm during the night. Maize or maize-meal should only be given to laying fowls in cold weather, and even then ought to be mixed with three or four times its bulk of other kinds of grain, and it should not be fed too freely to poultry in confinement. Buck wheat is one of the best of foods for laying fowls, but very poor for fattening; while all kinds of pulse, such as peas, beans, and tares, owing to the excess of flesh formers in their composition, as well as to their stimulating action, should not be fed alone, but as a mixture with other foods. Bone meal, although not a poultry food in itself, is most useful for mixing with such foods as are deficient in bone-forming substances. For chicken rearing it is invaluable as a preventive of leg weakness. If the fowls are situated so as not to obtain insects freely, a little meat may be given, but not otherwise, and in wet or cold mornings a little stimulating powder is helpful, but on no account should this be given when the weather is warm and dry. Green food is very essential, and an occasional supply of cabbages will be found beneficial, even should the grass run be extensive. As to system in the times of giving the food, a good general rule that may be observed is—first, a meal of soft food mixed with boiling water early in the morning, the sooner after the fowls leave their

roosts the better; second, a handful or so of grain in the middle of the day; and third, a good feed of grain about an hour before roosting time in the evening. Fowls of all kinds and ages should have access only to pure water. Farm yard drainage, water from the sink, or unclean water of any kind, are all unwholesome and promotive of disease. Stagnant water of any kind is bad. The fowls should always be supplied with fresh pure water, and the drinking vessels should be easily accessible at all times, and kept scrupulously clean. Another important point that must not be forgotten is that as material is required to form the shells, there must always be a supply of old mortar, broken oyster-shells, lime and gravel, the last being specially necessary to assist the fowls to digest their food. These may be taken as among the leading points to be attended to in carrying out the general object of keeping the stock in the best of health and condition; and the farmers who are attending to these main rules and are housing their fowls well, and feeding them as systematically as they do the other stock, are those whose experience can be quoted in support of the assertion that no other adjunct of their operations pays them better.

## Notes.

By the Sub-Editor.

During the hot months an occasional tonic is very useful in keeping fowls in healthy, active condition. There are many mixtures of an elaborate character which are doubtless excellent, but our object is to recommend what is most easily obtainable even in remote districts. Probably the tonic which most nearly complies with this requirement is sulphate of iron, mentioned in the *Sydney Mail* of 5th November last. Purchase at the chemist's half a pound of sulphate of iron crystals, and a very small quantity of sulphuric acid. To one gallon of water first add sixty drops of the sulphuric acid, and then the half-pound of sulphate of iron. When this is thoroughly dissolved bottle off, if possible in a spirit-jar, and cork tightly. Add about 1 ounce of the solution daily to each gallon of the drinking water. For immediate use add to the drinking water about three drops of acid and a piece of sulphate about the size of a cherry. It is also a good plan to add a fairly strong dose of the tonic to the soft food during the moulting season, say four or five times a week. Sulphate of iron is somewhat astringent in its operation, and it is therefore necessary to see that the fowls do not become too costive, a result which is more likely to happen when the birds are kept in a confined space. The sulphate of iron crystals should be kept perfectly air-tight to prevent deterioration.

Every poultry-keeper should grow sunflowers. A few of the seeds fed occasionally to the laying hens will have a most beneficial effect on their egg production. The large Russian variety will be found most satisfactory as being a prolific and reliable seeder.

It is essential that this season's chicks should have one meal of bran and pollard daily all through the summer. Advantage should be taken of this soft meal to give any youngsters having a tendency to leg-weakness a little ground bone. There is an extremely good bone-meal now obtainable from Spratt's Sydney agent, which will be found most effective. It is clean and entirely without any unpleasant smell.

There is often considerable difficulty in feeding chicks apart from the full-grown birds, especially where all have their liberty. A cheap and useful feeder may be knocked together with soft wood, and either laths or wire. It should be about 8 feet by 8 feet, and can be made by simply nailing the

four 8-foot lengths on four legs about 18 inches high, and then filling in with laths sufficiently close to prevent full-grown birds getting inside. The food can be placed on boards or trays in the middle, and the youngsters will soon get into the habit of going inside when they are hungry. The timber may be quite light, as there is practically no wear and tear.

Always keep the fowls drinking water where ducks cannot get at it. The fountain may be placed on a box about 18 inches to 2 feet off the ground as the ducks will not attempt to fly up even this height. It is better, if possible, to keep fowls and ducks apart, especially at feeding time.

The mention of ducks reminds me that it is of great assistance in fattening to give them their grain in water. Just throw the quantity you intend giving them into a good-sized tin dish or iron trough, and see how they enjoy the task of getting it out. It will be seen that this is a very natural way for water-fowl to take their food.

A very cheap and effective trough may be made out of an old piece of corrugated roofing iron. Just turn up the ends, and grove out a couple or three blocks (according to the length) for it to rest in. Never forget to keep these troughs clean. Dirty water is no better for ducks than for any other birds.

In order to preserve eggs for a good market, the following results of a prize competition at the last Birmingham Exhibition are worthy of note :— The first prize was given to eggs which had been stored in a solution of 4 lb. of lime in two gallons of water in an earthenware jar. The solution should be stirred occasionally for two days, and the eggs put to within 3 inches of the surface. The next most satisfactory method was simply placing the fresh eggs in common salt, and keeping them in a dry place. Other samples were rubbed over with melted suet, beeswax and oil or lard, and although they were good, none were so successful as the two methods first described.

# Sulphate of Ammonia in Potato Growing.

In the spring of the present year, the *Standard* newspaper—in their periodical article on "Home and Foreign Agriculture"—made mention of a method of treating seed-tubers practised by a French grower, to the following effect:—

"Experienced potato-growers will be apt to smile sceptically when they are informed that they can easily grow 42 tons per acre. Mr. Warburton, however, writing from La Rochelle, assures them that a French grower finds no difficulty in achieving so wonderful a result. This very successful producer selects the best and soundest of seed-tubers of medium size, and plants them whole, while he cultivates deeply and manures liberally. So far there is nothing at all out of the common; but the grower also immerses his seed-tubers for twenty-four hours in a solution of 6 lb. of sulphate of ammonia, and 6 lb. of nitrate of potash (saltpetre) in 25 gallons of water, allowing the tubers to remain for another twenty-four hours afterwards, so that the germs may have time to swell. It is to the increased activity of germination produced by this stimulating bath, that he attributes his enormous return. Perhaps some growers in this country will try the plan, and make known the results. If they get half the crop said to have been produced by the French grower, they will be well satisfied."

We learn that the suggested experiment has been carried out. The Rev. J. J. Milne, of Alleyn Park, West Dulwich, writing under date of the 22nd inst., says that, being sceptical as to the results said to have been obtained from the French grower's treatment, he determined to try it on a very poor piece of ground—viz., an old raspberry bed, which, of course, was trodden hard—and used as seed the small potatoes which remained after planting the other ground, the sets being very small, and weighing from ½oz. to 1 oz. each. The piece of ground was 21 yards long by 5½ yards wide, and the potatoes were planted in ten rows, allowing about 20 inches between the rows, and from 10 to 12 inches between the sets. He planted the seed with manure in shallow trenches, which were very difficult to make, owing to the hardness of the ground; and before planting, in accordance with the instructions given, he immersed the tubers for twenty-four hours in a solution of 1 lb. of sulphate of ammonia and 1 lb. of nitrate of potash in 5 gallons of water—allowing the tubers to remain for another twenty-four hours exposed to the air, so that the germs might have time to swell. They were planted on the 6th of April and were taken up on the 13th of September, and gave a return of 15½ bushels. The soil was heavy clay, which had not been worked for three years; but very few of the potatoes were diseased, and the tubers were decidedly above the average in size. Side by side with the above he planted a well-worked piece of ground, 21 yards long by 15½ yards wide, with good sound tubers of medium size, which gave a return of 30 bushels, very few being diseased. It will be seen at once, says the reverend gentleman, that the seed tubers which were soaked in the

solution gave a return at the rate of 651 bushels to the acre, while the others, though much larger tubers, and on superior soil, yielded only at the rate of 446 bushels to the acre. So that the yield from the former was nearly 50 per cent. more than that from the latter; and he has no doubt that, if the soil in the two cases had been of the same quality and the tubers of the same size, the crop from the former would have been still more abundant. The chemicals cost 1s. 3d. He recommends potato-growers to try the experiment next year with (say) a quarter of their seed, and carefully compare the result with the rest of the crop.

As the department has been asked several times to express an opinion about these results in French potato-growing, the above facts are given for what they are worth. It must be noted, however, that these results can be obtained only from land naturally very rich or well manured. It can be readily understood that this stimulating solution gives a stimulus to the young growth that enables it to develop greater power of foraging for its food. Wheat-growers have found the same benefit accrue from dressing their seed in the same way. The actual nitrogen and potash in the chemical manures employed in the solution contribute but little to the increase in yield, which must, of course, derive its nitrogen and mineral matters from the soil.

# Analyses of Commercial Fertilizers.

By F. B. GUTHRIE,
Departmental Analyst.
With Notes by the Director of Agriculture.

## Phospho-Guano.

A sample of manure known as phospho-guano, obtained from the Co-operative Acid and Chemical Manufacturing Company of Alexandria, has given the following results on analysis:—

| | | |
|---|---|---|
| Water ... ... ... ... ... | 6·244 per cent. | |
| Volatile and organic matter... ... ... | 45·368 ,, | (containing nitrogen, 3·220%) |
| Mineral matter ... ... ... ... | 48·388 ,, | |
| Sand and insoluble matter ... ... ... | 3·574 ,, | |
| Total phosphoric acid ($P_2O_5$) ... ... [37·491 per cent. phosphate.] | 17·174 ,, | $Ca_3(PO_4)_2$ |
| Soluble $P_2O_5$ (water) ... ... ... | 10·054 per cent. | |
| Soluble $P_2O_5$ (citrate) ... ... ... | 1·757 ,, | |
| Insoluble phosphoric acid ($P_2O_5$) ... ... | 5·363 ,, | |
| Potash $K_2O$ ... ... ... ... ... | ·708 ,, | |

This, says the Director, is a very useful and quickly-available manure peculiarly suitable for wheat, maize, and grasses of all kinds, citrus fruits, and green crops. With the addition of 4 to 10 per cent. of sulphate of potash, complete manures can be made suitable for any crop and any ordinary soil. The value, according to sample, is £6 14s. 6d. per ton.

## Odam's Fertilizers.

### Superphosphate.

An analysis of a sample of Odam's superphosphates, handed to the Department by Messrs. Holdsworth, Macpherson, & Co., the Sydney agents, shows the following results:—

| | | |
|---|---|---|
| Water ... ... ... ... ... ... | 12·824 per cent. | |
| Organic matter ... ... ... ... | 14·949 ,, | |
| (Containing nitrogen ·252 per cent., ammonia ·291 per cent.) | | |
| Mineral matter ... ... ... ... | 72·227 per cent. | |
| Total phosphoric acid ($P_2O_5$) ... ... | 18·228 ,, | (39·791 phosphate) |
| Soluble $P_2O_5$ (water) ... ... ... | 15·832 ,, | (34·611 phosphate) |
| Soluble $P_2O_5$ (citrate) ... ... ... | 1·102 ,, | |
| Insoluble $P_2O_5$ .. ... ... ... | 1·294 ,, | |
| Sand, &c. ... ... ... ... ... | 3·587 ,, | |

## Complete Manure.

The following results were obtained on analysis of a sample of Odam's complete manure, from the same source :—

| | | |
|---|---|---|
| Water ... ... ... ... ... ... | 10·012 per cent. | |
| Organic matter ... ... ... ... | 23·556 ,, | |
| (Containing nitrogen 3·501 per cent., ammonia 4·2 per cent.) | | |
| Mineral matter ... ... ... ... | 66·432 per cent. | |
| Total phosphoric acid ($P_2O_5$) ... ... | 12·568 ,, | (27·435 phosphate) |
| Soluble ,, (water) ... ... | 10·419 ,, | (22·744 phosphate) |
| Soluble ,, (citrate) ... ... | ·860 ,, | |
| Insoluble phosphoric acid ... ... ... | 1·289 ,, | |
| Potash ($K_2O$)... ... ... ... ... | 5·479 ,, | (8·685 potash chloride) |
| Sand ... ... ... ... ... ... | 7·538 ,, | |

## Specially Dissolved Bone Compound.

The following results were obtained on analysis of a sample of specially dissolved bone compound, from the same source :—

| | | |
|---|---|---|
| Water ... ... ... ... ... ... | 6·403 per cent. | |
| Organic matter ... ... ... ... | 29·995 ,, | |
| (Containing nitrogen 1·960, ammonia 2·380) | | |
| Mineral matter ... ... ... ... | 63·602 per cent. | |
| Total phosphoric acid ($P_2O_5$) ... ... | 16·533 ,, | (36·091 phosphate) |
| Soluble phosphoric acid (water) ... ... | 8·737 ,, | (19·093 phosphate) |
| ,, (citrate) ... ... | 2·523 ,, | |
| Insoluble phosphoric acid ... ... ... | 5·270 ,, | |
| Sand, &c. ... ... ... ... ... | 5·703 ,, | |

Commenting on the above, the Director says the samples are of excellent quality mechanically, and are well up to the guaranteed standard in every case. From the analyses the following are the values, based upon the selling prices of fertilizers offered for sale in the Colony :—

Superphosphate, about £5 12s. per ton; complete manures, £7 16s. per ton; and special dissolved bone compound, £5 12s. 6d. per ton.

As is the case with all other imported manures, the prices are found to be high when compared with the local articles, which are made of the same constituents as those imported, with this difference, however, that as there is little local demand for these waste products—superphosphate, sulphate of ammonia, bone meal, &c.—in this Colony, they must be sold cheap, whereas in England the great demand for them makes the prices higher.

# Analyses of Soils.

By F. B. GUTHRIE,
Departmental Analyst.
With Notes by The Director of Agriculture.

## Sherbrooke.

A sample of soil from Sherbrooke, *via* Bulli, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The geological formation of the surrounding country is Hawkesbury sandstone; the nature of the soil is sandy loam; the nature of the subsoil compact sand; the reaction of the soil is neutral, and its capacity for water 64 per cent. The absolute weight per acre 6 inches deep is 1,875,482 lb.

A mechanical analysis of the soil shows that it contains of root fibres, ·06 per cent.; stones over ¼-inch in diameter, 1·14 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 7·39 per cent.; fine gravel, more than $\frac{1}{50}$-inch diameter, 7·5 per cent.; fine soil, 83·91 per cent., comprising sand, 59·56 per cent., and impalpable matter, chiefly clay, 24·35 per cent.

An analysis of the fine soil discloses moisture, 9·803 per cent., and volatile and combustible matter, principally organic, 23·708 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consists of: Lime (CaO), ·238 per cent., the general value of which s good, being equivalent to 4,760 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·117 per cent., the general value of which is satisfactory, being equivalent to 2,340 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·186 per cent., the general value of which is good, being equivalent to 3,720 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·184 per cent. (equal to ·223 per cent. of ammonia), the general value of which is good, being equivalent to 3,680 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·122 per cent., general value of which is satisfactory; ferric oxide ($Fe_2O_3$) 1·797 per cent., general value deficient; and sulphuric acid ($SO_3$), ·119 per cent., general value satisfactory; ferrous oxide, 2·823 per cent.

In connection with the foregoing particulars, the special points of value in the soil and mechanical condition and vegetable matter. Its special defects

Note.—(*a*) This amount of lime would be supplied in 5,288 lb. of quicklime, or 6,988 lb. of slacked lime, or 9,440 lb. of chalk. (*b*) This amount of potash would be supplied in 4,680 lb. of commercial sulphate of potash, or 19,500 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 14,880 lb. of commercial bone-dust, or 22,320 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 18,400 lb. of sulphate of ammonia, or 22,080 lb. of nitrate of soda.

too much of the lower oxide. Its general character mechanically is very good, and chemically very fair. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are fruit, vegetables, greenstuff, and roots, while it is unsuitable, without special manure or special treatment, for cereals. The manures and treatment recommended for trial are thorough cultivation, to allow air to oxidise the lower black oxide of iron into the red oxide (rust); fallowing and draining would be very useful. For manure, 2 to 4 cwt. superphosphate of lime per acre.

Speaking generally, probably the best manure that can be used will be sub-drainage and constant turning over to the air. Wood ashes and lime would help to sweeten the soil, and a little manure would keep it in good heart.

## SUTHERLAND.

A SAMPLE of soil from Sutherland has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The geological formation of the surrounding country is sandstone; the nature of the soil is loam; the reaction of the soil is neutral; and its capacity for water, 36 per cent. Absolute weight per acre, 6 inches deep, 2,512,207 lb.

A mechanical analysis of this soil shows that it contains of root fibres, ·08 per cent.; stones over ¼-inch in diameter, 1·10 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 8·91 per cent.; fine gravel, more than $\frac{1}{30}$-inch diameter, 2·45 per cent.; fine soil, 87·46 per cent., comprising sand, 41·93 per cent., and impalpable matter, chiefly clay, 45·53 per cent.

An analysis of the fine soil discloses moisture, 2·596 per cent., and volatile and combustible matter, principally organic, 7·320 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·324 per cent., the general value of which is good, being equivalent to 6,480 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·130 per cent., the general value of which is satisfactory, being equivalent to 2,600 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·054 per cent., the general value of which is fair, being equivalent to 1,080 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·187 per cent. (equal to ·227 per cent. of ammonia), the general value of which is good, being equivalent to 3,740 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·131 per cent., general value of which is satisfactory; ferric oxide ($Fe_2O_3$), ·887 per cent.; general value deficient; and sulphuric acid ($SO_3$), ·086 per cent.; general value satisfactory; ferrous oxide, ·470 per cent.

In connection with the foregoing particulars, the special points of value in the soil are nil; its special defects, phosphoric acid and iron. Its general character mechanically is very fair, and chemically fairly good. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are summer fruit, greenstuff, grapes, maize; while it is unsuitable, without special manure or special treatment, for roots, strawberries, vegetables, and cereals. The manures and treatment recommended for trial are sub-draining to open soil to beneficial

NOTE.—(*a*) This amount of lime would be supplied in 7,200 lb. of quicklime, or 9,513 lb. of slaked lime, or 12,856 lb. of chalk. (*b*) This amount of potash would be supplied in 5,200 lb. of commercial sulphate of potash, or 21,666 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 4,320 lb. of commercial bone-dust, or 6,480 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 18,700 lb. of sulphate of ammonia, or 22,440 lb. of nitrate of soda.

influence of air; lime, 1 ton per acre, in autumn to break up clay and liberate latent potash; good bone-dust or superphosphate, 4 cwt. per acre, to supply phosphoric acid.

Speaking generally, sulphate of iron finely powdered (1 cwt. per acre) will be very valuable for potatoes and strawberries, if applied in the drills with bone-dust or superphosphate (Sugar Company's No. 2); if the latter manure be used, always apply it in the spring. For strawberries I recommend plenty of mulching with bush leaves, rotten tan, or well rotted stable manure to enable the soil to retain moisture better. With this, and the manures recommended, they ought to do well.

## Nowra.

A sample of soil from Forest Lodge, Nowra, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The nature of the soil is sandy loam; the reaction of the soil is neutral; and its capacity for water, 28·2 per cent. Absolute weight per acre, 6 inches deep, 2,738,066 lb.

A mechanical analysis of this soil shows that it contains of root fibres, ·08 per cent.; stones over ¼-inch in diameter, 20·52 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 13·22 per cent.; fine gravel, more than $\frac{1}{30}$-inch diameter, 5· per cent.; fine soil, 61·18 per cent., comprising sand, 30·58 per cent., and impalpable matter, chiefly clay, 30·60 per cent.

An analysis of the fine soil discloses moisture, 3·251 per cent., and volatile and combustible matter, principally organic, 5·513 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·221 per cent., the general value of which is good, being equivalent to 4,420 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·116 per cent., the general value of which is satisfactory, being equivalent to 2,320 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·112 per cent., the general value of which is satisfactory, being equivalent to 2,240 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·257 per cent. (equal to ·313 per cent. of ammonia), the general value of which is good, being equivalent to 5,140 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·175 per cent., general value of which is satisfactory; ferric oxide ($Fe_2O_3$), 2·228 per cent.; general value deficient; and sulphuric acid ($SO_3$), ·066 per cent.; general value fair; ferrous oxide, 1·046 per cent.

In connection with the foregoing particulars, the special points of value in the soil are nitrogenous matter, its special defects, none. Its general character mechanically is good, and chemically very fair. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are fruit, vegetables, hay, green-stuff; while it is unsuitable, without special manure or special treatment, for no crop suited to the district if properly cultivated. The manures and treatment recommended for trial are: Lime, which would be found very useful, 1 ton to the acre in autumn. Afterwards each crop should get

Note.—(*a*) This amount of lime would be supplied in 4,911 lb. of quicklime, or 6,489 lb. of slaked lime, or 8,769 lb. of chalk. (*b*) This amount of potash would be supplied in 4,640 lb. of commercial sulphate of potash, or 19,333 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 8,960 lb. of commercial bone-dust, or 13,440 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 25,700 lb. of sulphate of ammonia, or 30,840 lb. of nitrate of soda.

Sugar Company's No. 1 manure, 2 to 4 cwt. per acre for vegetables, oats, and green crops; for potatoes, No. 4 manure, 2 cwt. per acre.

Speaking generally, this soil wants plenty of working and opening up to the air, with which small dressings of manure ought to keep it in good heart.

## Campbelltown.

A sample of soil from Leumeah, near Campbelltown, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The nature of the soil is clay loam, the reaction of the soil is neutral; and its capacity for water, 46 per cent. Absolute weight per acre, 6 inches deep, 2,153,029 lb.

A mechanical analysis of this soil shows that it contains of root fibres, ·10 per cent.; stones over ¼-inch in diameter, 0 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 1·52 per cent.; fine gravel more than $\frac{1}{50}$-inch diameter, 2·5 per cent.; fine soil, 95·88 per cent., comprising sand, 31·62 per cent., and impalpable matter, chiefly clay, 64·26 per cent.

An analysis of the fine soil discloses moisture, 4·723 per cent., and volatile and combustible matter, principally organic, 11·527 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·251 per cent., the general value of which is good, being equivalent to 5,020 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·215 per cent., the general value of which is good, being equivalent to 4,300 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·128 per cent., the general value of which is satisfactory, being equivalent to 2,560 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·241 per cent. (equal to ·292 per cent. of ammonia), the general value of which is good, being equivalent to 4,820 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·267 per cent., general value of which is good; ferric oxide ($Fe_2O_3$), 4·960 per cent.; general value satisfactory; and sulphuric acid ($SO_3$), ·107 per cent.; general value satisfactory; ferrous oxide, ·359 per cent.

In connection with the foregoing particulars, the special points of value in the soils are potash and organic matter; its special defects, stiff nature. Its general character mechanically is tolerable, and chemically good. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are maize, beans, summer fruits, vines, cabbages, cauliflowers, while it is unsuitable, without special manure or special treatment, for citrous fruits, roots, tender vegetables. The manures and treatment recommended for trial are pipe-draining, 30 inches deep, for fruit-trees and any crops which will repay the expense; liming, 1 ton per acre, to break up the clay and liberate latent (unavailable) potash. Dried blood and bone-dust will give good satisfaction, and improve mechanical conditions of soil.

Speaking generally, draining and liming will deepen this soil and improve its condition for working, its power of retaining moisture and its mellowness, more than any manures; these will be necessary later on.

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Note.—(*a*) This amount of lime would be supplied in 5,577 lb. of quicklime, or 7,370 lb. of slaked lime, or 9,960 lb. of chalk. (*b*) This amount of potash would be supplied in 8,600 lb. of commercial sulphate of potash, or 35,833 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 10,240 lb. of commercial bone-dust, or 15,360 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 24,100 lb. of sulphate of ammonia or 28,920 lb. of nitrate of soda.

## THIRLMERE.

A SAMPLE of soil from Lakesland, Thirlmere, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The nature of the soil is loam; the reaction of the soil is neutral; and its capacity for water, 53·33 per cent.; absolute weight per acre, 6 inches deep, 2,210,171 lb.

A mechanical analysis of this soil shows that it contains of root fibres, ·04 per cent.; stones over ¼-inch in diameter, 1·35 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 8·64 per cent.; fine gravel, more than $\frac{1}{24}$-inch diameter, 3·12 per cent.; fine soil, 86·85 per cent., comprising sand, 38·18 per cent., and impalpable matter, chiefly clay, 48·67 per cent.

An analysis of the fine soil discloses moisture, 5·848 per cent., and volatile and combustible matter, principally organic, 16·987 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·652 per cent., the general value of which is very good, being equivalent to 13,040 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·197 per cent., the general value of which is good, being equivalent to 3,940 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·106 per cent., the general value of which is satisfactory, being equivalent to 2,120 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·408 per cent. (equal to ·469 per cent. of ammonia), the general value of which is good, being equivalent to 8,160 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·400 per cent., general value of which is good; ferric oxide ($Fe_2O_3$), 1,177 per cent., general value deficient; and sulphuric acid ($SO_3$), ·118 per cent.; general value satisfactory; ferrous oxide, 1·100 per cent.

In connection with the foregoing particulars, the special points of value in the soil are potash and vegetable matter; its special defects, rather stiff character, and percentage of ferrous oxide (deleterious oxide of iron). Its general character mechanically is very fair, and chemically, good. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are summer fruit, peas, vines, oats, vegetables; while it is unsuitable, without special manure or special treatment, for roots and citrus fruits. The manures and treatment recommended for trial are lime, which will be most valuable in decomposing vegetable matter for the use of the plants, and in setting free potash from the insoluble compounds in which it is now locked up. This ought to improve the soil mechanically, and unlock much of its vegetable and mineral wealth.

Speaking generally, apply the lime, 1 to 2 tons per acre, after ploughing and harrowing. It will descend into the subsoil quite quickly enough. In order to make the green crops as vigorous as possible, a light dressing of Gee's fertiliser (blood and bone-dust), 2 to 4 cwt. per acre ought to pay. Drainage will improve this soil very much for fruit-trees. Constant cultivation, with the aid of lime, will get rid of the injurious oxide of iron.

NOTE.—(*a*) This amount of lime would be supplied in 14,488 lb. of quicklime, or 19,145 lb. of slaked lime, or 25,872 lb. of chalk. (*b*) This amount of potash would be supplied in 7,880 lb. of commercial sulphate of potash, or 32,833 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 8,480 lb. of commercial bone-dust, or 12,720 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 800 lb. of sulphate of ammonia, or 48,960 lb. of nitrate of soda.

## Casino.

A sample of soil from Sandy Creek, Casino, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The nature of the soil is loam; the reaction of the soil is neutral; and its capacity for water, 33·4 per cent. Absolute weight per acre, 6 inches deep, 2,618,328 lb.

A mechanical analysis of this soil shows that it contains of root fibres, ·12 per cent.; stones over ¼-inch in diameter, 2·70 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 24·89 per cent.; fine gravel, more than $\frac{1}{50}$-inch diameter, 7·60 per cent.; fine soil, 64·69 per cent., comprising sand, 23·95 per cent., and impalpable matter, chiefly clay, 40·74 per cent.

An analysis of the fine soil discloses moisture, 2·751 per cent., and volatile and combustible matter, principally organic, 6·717 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·181 per cent., the general value of which is satisfactory, being equivalent to 3,620 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·101 per cent., the general value of which is satisfactory, being equivalent to 2,020 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·057 per cent., the general value of which is indifferent, being equivalent to 1,140 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·129 per cent. (equal to ·157 per cent. of ammonia), the general value of which is satisfactory, being equivalent to 2,580 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·109 per cent., general value of which is satisfactory; ferric oxide ($Fe_2O_3$), ·662 per cent.; general value deficient; and sulphuric acid ($SO_3$), ·092 per cent.; general value satisfactory; ferrous oxide ·856 per cent.

In connection with the foregoing particulars, the special points of value in the soil are none, its special defect, phosphoric acid. Its general character mechanically is good, and chemically, fairly good. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are fruit, green crops, grass; while it is unsuitable, without special manure or special treatment, for grain of any sort. The manures and treatment recommended for trial are that the ground should be well worked to change the deleterious ferrous oxide into the red oxide of iron (rust), and some form of phosphates should be added—Sugar Company's No. 1 or bone-dust—4 cwt. per acre.

Speaking generally, with good bone-dust or superphosphate, as made by Sugar Company, this soil should give very fair returns for grass, hay, and other crops suited to the district; otherwise the phosphoric acid will soon be exhausted by cropping.

## Kurrajong.

A sample of soil from Ivanhoe, Kurrajong, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The nature of the soil is loam; the reaction of the soil is neutral; and its capacity for water, 47·66 per cent.; absolute weight per acre, 6 inches deep, 2,290,134 lbs.

Note.—(*a*) This amount of lime would be supplied in 4,022 lb. of quicklime, or 5,314 lb. of slaked lime, or 7,182 lb. of chalk. (*b*) This amount of potash would be supplied in 4,040 lb. of commercial sulphate of potash, or 16,833 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 4,560 lb. of commercial bone-dust, or 6,840 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 12,900 lb. of sulphate of ammonia, or 15,480 lb. of nitrate of soda.

A mechanical analysis of this soil shows that it contains of root fibres, 0·4 per cent.; stones over ¼-inch in diameter, 66 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, 1·77 per cent.; fine gravel, more than $\frac{1}{50}$-inch diameter, ·79 per cent.; fine soil, 96·74 per cent., comprising sand, 50·29 per cent., and impalpable matter, chiefly clay, 46·45 per cent.

An analysis of the fine soil discloses moisture, 3·567 per cent., and volatile and combustible matter, principally organic, 9·222 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·2 per cent., the general value of which is good, being equivalent to 4,000 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·195 per cent., the general value of which is good, being equivalent to 3,900 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·222 per cent.. the general value of which is good, being equivalent to 4,440 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·165 per cent. (equal to ·200 per cent. of ammonia), the general value of which is good, being equivalent to 3,300 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·350 per cent., general value of which is good; ferric oxide ($Fe_2O_5$), 4·149 per cent.; general value satisfactory; and sulphuric acid ($SO_3$), ·089 per cent.; general value satisfactory; ferrous oxide, ·506 per cent.

In connection with the foregoing particulars, the special points of value in the soil are potash and phosphoric acid; its special defects, none. Its general character mechanically is very fair, and chemically, good. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are summer fruits, vine, peas, beans, green crops, while it is unsuitable, without special manure or special treatment, for none suited to the climate. The manures and treatment recommended for trial are sub-draining for fruit-trees and vegetables. One ton of lime per acre would liberate the insoluble potash and make it available for plants. Superphosphate of lime (Sugar Coy.'s No. 1 or No. 2 manures), should be of great benefit to citrous fruits.

Speaking generally, light dressings of soluble manures should pay in the quality of the fruit, but with proper cultivation and liming very little should be necessary for the first five years on new land.

## Byron Bay.

A sample of soil from Rose Vale, Byron Bay, has been submitted to analysis by Mr. F. B. Guthrie, F.C.S., the Analytical Chemist to the Department. The nature of the soil is sand; the reaction of the soil is neutral; and its capacity for water, 40 per cent.; absolute weight per acre, 6 inches deep, 2,787,840 lb.

A mechanical analysis of this soil shows that it contains of root fibres, 1·0 per cent.; stones over ¼-inch in diameter, ·0 per cent.; coarse gravel, more than $\frac{1}{10}$-inch diameter, ·0 per cent.; fine gravel, more than $\frac{1}{50}$-inch diameter, 7·18 per cent.; fine soil, 91·82 per cent., comprising sand, 89·43 per cent., and impalpable matter, chiefly clay, 2·39 per cent.

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Note.—(*a*) This amount of lime would be supplied in 4,444 lb. of quicklime, or 5,872 lb. of slaked lime, or 7,936 lb. of chalk. (*b*) This amount of potash would be supplied in 7,800 lb. of commercial sulphate of potash, or 32,500 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 17,760 lb. of commercial bone-dust, or 26,640 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 16,500 lb. of sulphate of ammonia, or 19,800 lb. of nitrate of soda.

An analysis of the fine soil discloses moisture, ·612 per cent., and volatile and combustible matter, principally organic, 3·640 per cent.

The fertilising substances soluble in hot hydrochloric acid of 1·1 specific gravity consist of: Lime (CaO), ·205 per cent., the general value of which is good, being equivalent to 4,100 lb. (*a*) in an acre of soil 6 inches deep; potash ($K_2O$), ·049 per cent., the general value of which is indifferent, being equivalent to 980 lb. (*b*) in an acre of soil 6 inches deep; phosphoric acid ($P_2O_5$), ·031 per cent., the general value of which is indifferent, being equivalent to 620 lb. (*c*) in an acre of soil 6 inches deep; nitrogen, ·073 per cent. (equal to 0·88 per cent. of ammonia), the general value of which is fair, being equivalent to 1,460 lb. (*d*) in an acre of soil 6 inches deep. There is also of magnesia (MgO), ·080 per cent. general value of which is indifferent; ferric oxide ($Fe_2O_3$), ·048 per cent.; general value deficient; sulphuric acid ($SO_3$), ·051 per cent.; general value fair; and ferrous oxide ·00 per cent.

In connection with the foregoing particulars, the special point of value in the soil is its mechanical conditions, its special defects, phosphoric acid, potash, iron, nitrogenous matter. Its general character mechanically is very good, and chemically poor. The crops for which it is most suitable, judging by its mechanical condition, chemical composition, and the climate of the district, are none without assistance, after first crop vines, lucerne, and fruit-trees would do best, while it is unsuitable, without special manure or special treatment, for any heavy crops. The manures and treatment recommended for trial are dried blood and bone-dust, 4 to 6 cwt. per acre, for grass and green crops of all sorts. Wood ashes will improve it, also ploughing in green crops, especially peas and tares, or even weeds, if nothing better.

Speaking generally, it seems very doubtful if it would pay to manure this soil. It would be preferable to give it as much ashes as possible, and a dressing of 6 cwt. per acre of good blood and bones, and lay it down to good grass.

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Note.—(*a*) This amount of lime would be supplied in 4,555 lb. of quicklime, or 6,019 lb. of slacked lime, or 8,134 lb. of chalk. (*b*) This amount of potash would be supplied in 1,960 lb. of commercial sulphate of potash, or 8,167 lb. of kainit. (*c*) This amount of phosphoric acid would be supplied in 2,480 lb. of commercial bone-dust, or 3,720 lb. of superphosphate. (*d*) This amount of nitrogen would be supplied in 7,300 lb. of sulphate of ammonia, or 8,760 lb. of nitrate of soda.

# General Notes.

## Pomological Committee.

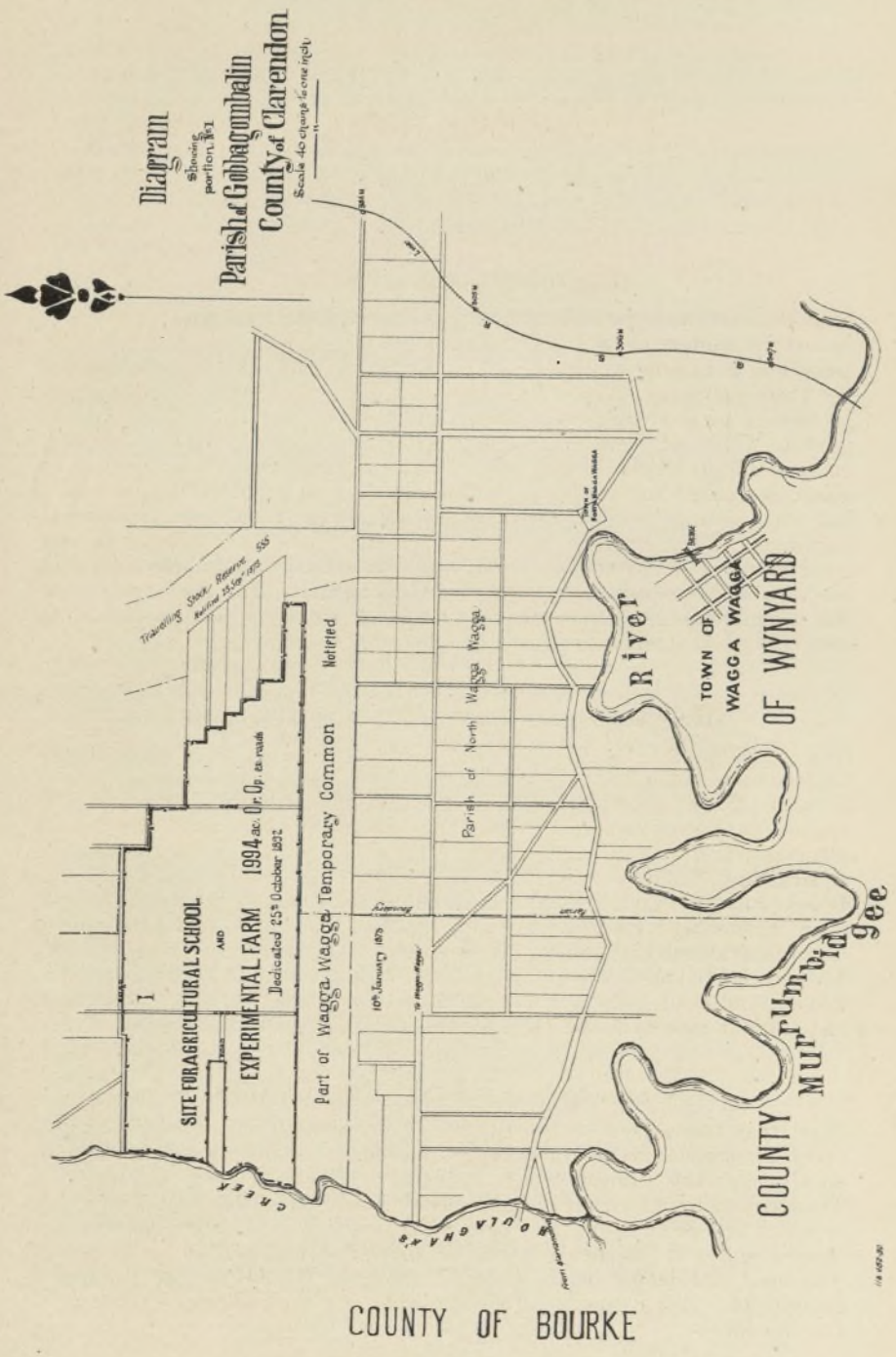
The Minister has approved of the appointment of a Pomological Committee to meet in conference with the fruit expert of the Department, in order to assist him in naming well-known varieties of fruit and seedlings submitted for their judgment. This Committee will consist of three practical fruit-growers of acknowledged ability in their avocations, nominated by the Fruit-growers' Union of New South Wales; three nominated by the Department, and two officers of the Department. It is proposed that there should be about two meetings annually, to be held in the offices of the Department; but the meetings will be convened by the Department when considered necessary. The Committee will be authorised to have models made of any good varieties of Australian fruit, and to name and publish descriptions of any new seedlings deemed worthy of the distinction. The appointments to this Committee are honorary, but travelling expenses will be allowed to members when summoned to meet on this business.

## Hawkesbury Agricultural College.

The examinations for the first diplomas granted by the Hawkesbury College were completed at the close of last session. It was thought that, in view of the importance of these examinations, it would be preferable to appoint gentlemen outside the Colony as examiners, and arrangements were ultimately made with the Principals of the Victorian and South Australian Agricultural Colleges to act in this capacity. Professor Lowrie, of the Roseworthy College, South Australia, undertook Chemistry, English, Veterinary Science, and Practical Agriculture; Mr. T. K. Dow, of Longeronong, Victoria, Natural Philosophy, Mensuration, and Arithmetic; and Mr. W. Brown, of Dookie College, Victoria, the Principles of Agriculture, Entomology, and Book-keeping. All the papers were set by these gentlemen, and on their reports to the Minister the diplomas will be awarded.

## Crickets injuring Fruit-trees.

Now that the season is approaching when another invasion of crickets (*Gryllus servillei*, Sauss.) may be anticipated, we would refer orchardists to an article on this subject, which appeared in Vol. III, Part 4, page 270. There will be found recommended remedies which have either proved effective, or which are worth trying by way of experiment. In addition to the remedies there given, it is suggested that a mixture of arsenic and sugar, thickened with meal, and dabbed on the stems of the trees, should be tried by way of experiment. A correspondent has forwarded us the following extract from the *Garden*:—



"Rhubarb leaves are said to be a cure for crickets. A large bakehouse was some years ago infested with crickets. As the hot weather came on the nuisance became very serious. The baker was advised to lay some rhubarb leaves about the place. The light of the morning revealed nibbled leaves and myriads of dead crickets; and this was the last of them in that bakehouse."

As the practice in allowing poultry to run in the orchard is comparatively common, it is well to mention that they should be carefully excluded when poisonous remedies are being used. On the other hand, should the invasion of insects be slight, poultry, turkeys especially, will be found very effective in keeping them under.

## Anthracnose and Sulphate of Iron.

At a meeting of the Central Agricultural Bureau of South Australia on the 24th October last, the Secretary reported that Mr. W. F. Snow had shown a branch of a vine badly attacked by anthracnose. This vine was left untreated, whilst adjacent vines treated with the sulphate of iron solution during September, before the leaves appeared were so far perfectly free from disease.

## Murrumbidgee Experimental Farm.

The area decided upon as a suitable site for an agricultural school and experimental farm at Wagga Wagga having been finally dedicated to the Department of Agriculture, we are enabled to give a correct plan showing the position of the farm as regards the town of Wagga Wagga. It will be seen that the area covers 1,994 acres, and that it is bounded along the western border by Houlaghan's Creek. Considerable progress has already been made with the necessary clearing and fencing. Steps are also being taken with a view of planting an orchard with fruits suitable to the district, and a large area will be set aside for the purposes of a vineyard, as in all likelihood a school of viticulture will form an important adjunct to this farm.

## National Prizes for Representative District Shows.

In continuance of the policy inaugurated a couple of years ago of providing a series of National Prizes (supplementing the ordinary schedules of the Societies) for competition at certain Agricultural Shows throughout the Colony, the Minister has, subject to the vote of Parliament, approved of the following grants from the funds of 1893:—District No. 1, Lismore, £200; No. 2, Maitland, £350; No. 3, Camden, £350; No. 4, Moruya, £150; No. 5, Inverell, £250; No. 6, Dubbo, £350; No. 7, Goulburn, £300; No. 8, Wagga, £350; No. 9, Coonabarabran, £100; No. 10, Moama, £100. In the cases of Lismore, Camden, Moruya, Inverell, and Goulburn, whose Shows for 1893 are to be held within the first quarter of the year, the Minister has considered it advisable to stipulate that the prizes shall be offered at their Shows in 1894, as insufficient time is now available in which to properly advertise the lists and secure representation commensurate with the importance of the prizes. In other instances, the amounts will be available for competition at the next forthcoming Shows, viz.: Maitland and Dubbo, in April; Wagga, Coonabarabran, and Moama, in September, 1893.

# AGRICULTURAL SOCIETIES' SHOWS, 1893.

| Society. | Secretary. | Date of Show. |
|---|---|---|
| Wollongong A. and H. Association ... ... ... | J. A. Beatson ... | Feb. 1, 2 |
| Alstonville and Richmond River F. C. and A. and H. Society ... ... ... ... ... ... ... | P. J. Daley ... | Feb. 1, 2 |
| Wollongong A. and H. Association ... ... ... | J. A. Beatson ... | Feb. 1, 2 |
| Gosford Agricultural Show ... ... ... ... | H. S. Beveridge | Feb. 3, 4 |
| Clunes A. Society ... ... ... ... ... ... | W. Moses... ... | Feb. 8, 9 |
| Broughton Creek (Berry) Agricultural Society ... | H. J. Colley ... | Feb. 8, 9, 10 |
| Manning River A. and H. Association ... ... ... | W. Plummer ... | Feb. 9, 10 |
| Dapto A. and H. Society ... ... ... ... ... | F. W. Lane ... | Feb. 11 |
| Moruya A. and H. Society ... ... ... ... | J. Kay ... ... | Feb. 15, 16 |
| Shoalhaven Agricultural Society, Nowra ... ... | R. Leeming ... | Feb. 15, 16 |
| Ulladulla A. and H. Association ... ... ... ... | C. A. Cork ... | Feb. 21, 22 |
| Luddenham Agricultural Society... ... ... ... | K. Campbell ... | Feb. 21, 22 |
| Armidale (New England) A. and P. Society ... ... | W. H. Allingham | Feb. 21, 22, 23 |
| Candelo A. H. and D. F. Association ... ... ... | C. H. Brooks ... | Feb. 22, 23 |
| Tumut P. and A. Association ... ... ... ... | W. H. Bridle ... | Feb. 22, 23 |
| Berrigan A. and H. Society ... ... ... ... | E. J. Gorman ... | Feb. 23 |
| Kangaroo Valley A. and H. Society ... ... ... | H. Joyce ... | Feb. 23, 24 |
| Lithgow A. and H. Society ... ... ... ... | D. M. Asher ... | Feb. 23, 24 |
| Macleay A. and H. Association ... ... ... ... | H. R. Gray ... | Feb. 22, 23, 24 |
| Southern New England P. and A. Association ... ... | J. D. Leece ... | Feb. 28, Mar. 1 |
| Robertson Agricultural Society ... ... ... ... | R. G. Ferguson | Feb. 28, Mar. 1 |
| Walcha P. and A. Association ... ... ... ... | W. J. Gibson ... | March 1, 2 |
| Bega A., P., and H. Society ... ... ... ... | A. J. Wilson ... | March 1, 2 |
| Picton A. and H. Society ... ... ... ... ... | G. Bradbury ... | March 1, 2 |
| Port Macquarie Agricultural Society ... ... ... | A. E. Pountney | March 1, 2 |
| Nepean District A., H., and I. Society ... ... ... | R. Benaud ... | March 2, 3 |
| Walcha P. and A. Association ... ... ... ... | H. Chapman ... | March 8, 9 |
| Namoi P. and A. Association, Narrabri... ... ... | J. Riddle ... | March 8, 9 |
| Berrima District A., H., and I. Society... ... ... | J. Yeo ... | Mar. 9, 10, 11 |
| Murrumbidgee P. and A. Association (Summer Show) | C. H. Croaker... | March 8, 9 |
| *Camden Agricultural Society ... ... ... ... | W. R. Cowper... | Mar. 15, 16, 17 |
| Tenterfield P. and A. Association ... ... ... | J. Harker ... | Mar. 15, 16, 17 |
| Gunning P. and A. Society ... ... ... ... | Timmis & Sands. | March 21, 22 |
| Blayney P. and A. Association ... ... ... ... | G. H. Woolley .. | Mar. 22. 23 |
| *Inverell P. and A. Association ... ... ... ... | James M'Ilveen . | March 22, 23 |
| *Goulburn P. and H. Society ... ... ... ... | J. J. Roberts ... | March 23, 24 |
| Royal Agricultural Society, Sydney ... ... ... | F. Webster ... | March 29 to April 4. |
| Mudgee Agricultural Society ... ... ... ... | J. M. Cox ... | April 19, 20, 21 |
| *Hunter River A. and H. Association ... ... ... | W. C. Quinton | April 26, 27, 28 |
| *Dubbo P., A., and H. Association ... ... ... | G. H. Taylor ... | April 26, 27 |
| Upper Hunter P. and A. Association, Muswellbrook ... | P. Healey ... | May 3, 4 |
| Warialda P. and A. Association ... ... ... ... | W. B. Geddes ... | May 3, 4 |

* These Societies get the National Prizes.

[6 plates and 1 block.]

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