

should explore all avenues of attack until we have found out the most suitable measure for each pest and region. Our main aim is to help the sugar planter as quickly and economically as possible.

Before concluding this short note the attention of entomologists and others interested in the sugar industry in India may be invited to the fact that, while we are engaged in devising ways and means to fight our local pests, we should not forget to provide ourselves with the proper precautions which will prevent the entry of the some of the serious sugarcane pests of other countries such as the sugarcane weevil¹ of Australia, the dreaded leaf hopper² of Hawaii, the frog hopper³ of Trinidad, the cockchafer⁴ of Mauritius or the widely distributed moth borer⁵ of the West Indies—insects which have been causing very serious losses to the sugar industry in their respective countries. It is needless to add that in these days of rapid and convenient transportation facilities, animals and plants have very good chances of getting widely dispersed from place to place. I believe some of us are already aware of the fact that on two occasions the Imperial Entomologist, Pusa, while examining parcels of sugarcane setts received from abroad, came across the live grubs of the West Indian sugarcane weevil (*Sphenophorus sacchari*) in a parcel from Antigua and that of the Javanese beetle pest (*Holanaria picesens*) in a parcel from Java. It is incumbent on us, therefore, to see that two objectives are kept in view, viz., the control of the existing pests on the one hand and the prevention of exotic pests from entry. For, while we are engaged in solving our own insect problems connected with sugarcane, we should also be careful to see that no exotic pests of any kind get entry into the country and add to our already existing troubles.

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NOTE ON THE CULTIVATION OF PINE APPLE ON THE LOWER PALNI HILLS

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The cultivation of pine apple, was first introduced on the lower Palni hills about 18 years ago by Mr. Bell, who was working as a coffee expert under Messrs. Stanes & Co., who then managed large estates both on Sirumalai and lower Palni hills. He introduced an Australian variety and it was propagated later on carefully by the Roman Catholic Missionaries in their estates on the hills. However, the crop was abandoned by them later on, owing to considerable damage done by

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| 1. <i>Rhizdocnemus obscurus</i> , B. | 3. <i>Tomaspis saccharina</i> , D. |
| 2. <i>Perkinsiella saccharida</i> , P. | 4. <i>Phytalus nitidus</i> , A. |
| 5. <i>Diatraea saccharalis</i> , F. | |

wild pigs to it. With some difficulty an Indian Planter Mr. P. W. A. Marimuthu Nadar, managed to secure some plants through Mr. Bell in the year 1912—1913, and planted them in his bungalow compound on the hills. He gradually extended the cultivation. Finding this growing successfully he laid out a pine-apple plantation in the year 1920 and made known the availability of fruits by sending them to important markets. To-day there are 10 acres under this crop in his estate, compactly fenced all round by stone walls of 3 to 4 feet height to prevent the entry of wild pigs into this garden.

It is cultivated on the slopes of the hills at a height of nearly 3400 to 4000 feet above the sea level. The total rainfall in the region ranges from 60 to 65 inches per year. Except during the three or four hot months in the year, this portion of the hill has a fine climate. It is also cultivated in the midst of coffee estates where the tall silver oak trees provide them shade and thus in a way reduce the temperature even in the hottest part of the year.

The Soil. The nature of soil is gravelly on the upper portions of the slope with good black loam inter-mixed with organic matter, resting on a rocky bed below at a depth of one to two feet. The soil in the lower portion of the slope is a very rich loam mixed with small stones resting on a rocky stratum 3 to 4 feet below. Originally the whole region was under hill grass called Pothai growing to a height of four to five feet. This grass is generally used for thatching houses. The region under this grass is generally considered not suited for coffee, the soil being rather shallow. Hence this was taken up for Pine Apple growing.

Preparation of the Land. The hill grass was first burnt and then the stumps were lifted by mammutties and allowed to dry well during the summer. They were again burnt and the ash was well spread over the area. The whole area was then dug to a depth of one foot by mammutties. The stones obtained were as far as possible, usefully employed in building up the wall to form a protective fence. A portion of the stones thus collected, was used for terracing which protected the surface soil from erosion during heavy rains. There are three such terraces in a plot of 10 acres to a height of 1 to 1½ feet above the ground level. The clearing of grass jungle cost nearly Rs. 25/- per acre; while the digging of the land for the planting of suckers cost nearly Rs. 10/- per acre in the first year. The cost of removing the stones depends upon the nature of the land selected. However this particular, planter, has spent nearly Rs. 2500/- for removing the stones and utilising the material for constructing a stone wall along the boundary in a plot of 10 acres.

Selection of Suckers for Planting. Vegetative propagation is the general method adopted in the cultivation of this crop. The offshoots called suckers are removed from old plants for planting. The suckers

on the tops of the fruits as well as the whorl of suckers just at the bottom of the fruits are generally stunted in growth, with stout narrow serrated leaves. These suckers are generally avoided for planting, as they are slow growers taking nearly 2 years for bearing fruits. The suckers coming up from the underground portion of the stems are always long and slender with long narrow and smooth leaves. Even these are avoided for planting as they are far more slow growers, taking more than 2 years to bear fruits. But the suckers appearing at the axils of leaves just 2 or 3 axills below the top of the flower stalk are selected for propagation. These suckers are robust with thick long stems bearing broad and tapering leaves. Thus out of 4 types of suckers coming up from any old plant, only those arising at the axils are selected for propagation. These suckers come to bear fruit much earlier than the other type of suckers. However the period of fruiting even in these suckers depends upon their age from the period of their inception from the axils. It is generally observed that 6 months old suckers bear fruits in a year. Such suckers will be about $1\frac{1}{2}$ ft. in height. The same character has been observed even in the case of plantains on the hills.

Planting. The whole area is marked both length wise and cross-wise by rope at 4' apart and small pegs are driven at each point of crossing of the ropes. Pits $1 \times 1 \times 1$ are opened at the places of the pegs. The suckers are just planted in the pits and covered with loose soil. Thus about 1200 to 1300 suckers are required to plant an acre. The cost of opening pits after marking is Rs. 10/- per acre, while the charges for collecting and planting of suckers comes to nearly Rs. 3/- per acre. After planting no irrigation is given in the hills. The planting of suckers is generally done in Chitrai (April - May) on the hills when summer showers are usually received. It is during this period that the hill plantains are generally planted on the hills.

After Cultivation. During the first year, only one hoeing is given just after rains. But in the subsequent years the whole crop is hoed thrice in a year at the end of every fourth month, at a total cost of Rs. 15/- per acre per year. Each plant is earthed up during the time of hoeing.

Removing Suckers. Along with hoeing and particularly just after harvest of the fruits, the suckers except those at the top of the fruits as well as those at the axils of the stems, are invariably removed. This operation is done with a view to prevent the unnecessary wastage of nutrition from the mother plants. But it gives full opportunity for the proper and quick development for those suckers which would form the future mother plants.

Manuring. This crop has not been manured in the garden ever since it was started. The cost of manuring a crop on the hills is prohibitive owing to enormous cost of transport of the manure from the

plains. Under such circumstances the planters do not ordinarily manure other crops except coffee on the hills.

The Harvest. The formation and development of fruits, generally depend upon the age of the suckers as stated above and also on the fertility of the soil. As the soil on the slopes of hills varies in fertility and depth, all the plants do not come to bearing in the first year alone. A fair percentage of the plants bear fruits in the first year. The remaining plants bear fruits in the following December—January. Thus two yields are obtained from the crop in a year on the hills. However the heavier yield is obtained from the main season crop. Even from the season crop the maximum yield is obtained in the months of June—July. The harvest of fruits is regularly done at the interval of one week commencing from April and it is finished by the end of August. The proper maturity of a fruit is indicated by the development of external yellow colour from the bottom portion of the fruits. When the yellow colour spreads up to three-quarters, the fruits are harvested and sent to the plains for sale. Till they are disposed of either locally or in the market the fruits are arranged on the floor in rows with the top suckers. The cost of picking out the fruits from the fruit stalks and carrying them to the plains works out at the rate of Rs. 10/- per 1000 fruits.

Taste. The pine apple requires full 6 months for proper development and maturity from the period of its appearance, on the flower stalk. The seasonal changes during the long period of development have been found to cause marked changes in the taste of the fruits. The prevailing of heavy dew on the hills before the summer crop of December - January, has something to do with the taste of the fruits. Thus the summer fruits always taste more sour than season fruits. The taste of the fruit depends also on the nature of soil. Pine apple growers' experience is that pine apple grown on the lands cleared of grass jungle is always more delicious than the fruits of the same variety grown in other parts. (i. e.) after clearing the forest. The fruits grown on the grass regions, are found to possess a golden yellow colour when fruits are cut open whereas they look rather white in fruits procured elsewhere. (It may be worth mentioning in this connection that Mr. H. G. Stokes, the finance Member to the Government of Madras, after the lapse of long interval, recognised this variety from its golden yellow colour of the *perianth*.) Thus it seems clear that the golden yellow colour of the fruits always indicates the delicious taste of the fruits. However the constitution of the hill grass called 'Pothai' is not known. The salts left after burning the grass may have something to do with the taste of the fruits grown over this jungle cleared of this grass.

Keeping Quality. The fruits can keep, generally for a week. But the keeping quality of fruits can be increased upto 10 days, if the

suckers at the top of the fruit are not removed and the fruits are stored without overlapping. If the suckers are removed, the fruits can keep barely for a week.

Size of Fruits. The size of the fruits become smaller as the age of the garden advances. In this particular garden the fruits used to weigh 4 lb. to 5½ lb. till the garden was 7 or 8 years old. Thereafter the size of the fruits is gradually getting smaller in size. Now the original plantation is about 13 years old but still the fruits weigh upto 2½ lbs. It is worth mentioning, that this garden has not been manured all these thirteen years. On inspection, I find this now not in prosperous condition; it is high time that that garden is cleared and fresh area brought under this crop. Thus it may be stated that a garden of pine apple, under ordinary circumstances, can be continued with profit upto 12 years on the hills. The planter, has been advised however to apply the mixture of neem cake and fish manure to a portion of 2 acres, during the next season and to see how the bearing is.

Variety. The variety just grown on this hill, though resembles the well known 'KEW' variety, grown in the west coast, has different characters. Both resemble in one respect having smooth leaves with the top leaves incompletely serrated. But they differ in the following points (i) The kew variety is more robust and produces much longer leaves than this variety. (ii) The midrib region of the leaves is dark pink coloured in kew variety, while it is yellow coloured in this variety. (iii) The perianth of each fruit of the pine apple is surrounded with light pink colour even in the mature stage in the kew variety, while it is golden yellow in this particular variety. The same planter has recently planted some 16 suckers of the kew variety obtained from Punalur on the west coast in a new garden of 2 acres devoted for this cultivation. They are just bearing fruits and one can very easily mark the kew variety from the other. Thus it seems that the variety originally cultivated by this planter is altogether a different one.

Marketing. This planter was it appears careful in removing the top suckers before the produce was sent for marketing. His idea was to reserve all material for extending the cultivation of this variety only in his estate. Thus he managed for 8 years and prevented the spreading of this variety both on this hills or anywhere else. Once he extended the plantation and brought the area to this desired extent, he did not mind sending the produce with suckers on. He has also been freely supplying suckers to others thereafter.

Besides supplying the markets of Madura and Tinnevely, these fruits are transported to Kumbakonam, Tanjore and Madras in the north. These fruits are mainly transported to all the markets except Madras by a motor lorry kept for the purpose. The best fruits at his depot at Pattiveerampatty are sold at 0-6-0 each. Such fruits are generally purchased by European Officers of this District. The

medium size fruits are sold at 3 to 4 annas each. The lower grade are sold at 1 to 2 annas each.

Income. From the pine apple estate of 10 acres, the planter gets a gross income of Rs. 1000 per year, but his total charges for this estate including three hoeings removing suckers, and earthing up the plants, come to Rs. 300 per year. In addition cooly and supervision charge come to Rs. 400 per year. Thus he realises in normal years a net income of Rs. 300 per acre.

It seems that the planter has obtained a net income of even Rs. 400 per acre for nearly 12 years even when the damage by wild pigs was at its minimum. It was only then he advertised about the high qualities and delicious taste of the fruits in all the markets in the south. Recently the demand for the fruits has not been so keen as it was once before.

Wild pigs are regular enemies for this crop. The smell of these fruits attract a number of them during nights. Wild pigs not only damage the fruits but also uproot the plants to eat away the worms which are commonly found in the soil.

Notes & Comments.

Agricultural Meteorology. An important aspect of agricultural research which has recently attracted the attention of many works all over the world is Agricultural Meteorology. Very little attention appears to have been paid till now, at least in this country, to the study and the investigations on the various influences exerted by variations in the several weather factors like rainfall, temperature, humidity etc. on crop growth, crop returns, incidence of diseases and pests and the economic result in general. Workers in different aspects of agriculture are now beginning to realise, that changes in weather, in different areas, have a corresponding beneficial or evil effect on the crops, and studies on the ecology of plants and animals are now made in close relation to seasonal and whether changes. Forecasting of weather conditions even for such a short period as a week would be found very helpful to the agriculturist in some tracts. We would invite the attention of those interested in this subject to the three volumes of Bibliography on Agricultural Meteorology recently issued by the Ministry of Agriculture and Fisheries. Recently we also had a very interesting talk on this subject at the Agricultural College by Dr. L. A. Ramadass stationed in Poona as the Agricultural Meteorologist working under the Imperial Council of Agricultural Research.

Research on Pure and applied Sciences. Among certain Institutions and administrators there is at present a tendency to discourage all scientific research which does not show any immediate relation to