

An interesting feature with this work is that mathematicians have taken an interest in it, and one man has actually worked out a formula for calculating the fat test for any specified age, provided that the average test for the first milking period is known.

The effect of age on the other constituents of milk has also been studied and there is a decrease, with age, in all constituents except albumen, which increases slightly from year to year.

The effect of age on the fat test (richness) of milk should not be confused, with the effect of age on milk production. There is a gradual increase in the quantity of milk produced from year to year until a maximum period is reached after which the production figures show a slow decline. The age of maximum milk production for most breeds has been shown to be eight or nine years.

Chlorosis of Citrus in Puerto Rico. *Phytopathology*, Vol. 27, No. 6. Citrus leaf chloroses due to plant nutrient deficiencies have been reported in almost every region in which citrus plants are grown. Information regarding the causes and distribution of these diseases is in many cases incomplete. This note describes the symptoms and soil relations of a chlorosis causing losses to grapefruit growers in Puerto Rico, and reports the beneficial effects on diseased trees of zinc sulphate, already used elsewhere successfully in the treatment of "mottle-leaf" in citrus. It thus records the occurrence in an additional geographical area of what appears to be a similar deficiency disease.

The symptoms on diseased grapefruit trees in Puerto Rico resemble closely those described for the citrus disease known as "mottle-leaf" in California and "frenching" in Florida. Irregular chlorotic blotches first develop between the larger secondary veins on each side of the leaf midrib, becoming more pronouncedly yellow and increasing in area with increased severity of the disease. In severe cases tissues next to the larger veins and midrib remain green, while the rest of the leaf becomes completely yellow. Trees affected for several seasons frequently produce multiple buds resulting in a bushy growth at the ends of the part or most of the branches. Severely affected trees bear little or no fruit and finally become so weak that they are commercially valueless.

Diseased trees in Puerto Rico have been found on areas of alkaline soil of sedimentary origin, testing pH 8.0 to 8.5 near affected trees, none having yet been found on the acid soils of the island.

In preliminary tests, lots of 5-year old, severely diseased trees were sprayed with water solutions of copper sulphate, iron sulphate, zinc sulphate and manganese sulphate. Three weeks after the sprays were applied trees treated with zinc sulphate began to show signs of response. New healthy appearing leaves were formed, and some of the chlorotic leaves began to recover their green colour. Five weeks and 7 weeks after treatment diseased trees sprayed with zinc sulphate continued to show favourable recovery. Trees treated with copper sulphate shed their leaves. Iron sulphate and manganese sulphate gave no response.

Agricultural Fottings.

(THE DEPARTMENT OF AGRICULTURE, MADRAS)

The Mahali Disease of Arecanuts. *Success of Departmental Propaganda.* It will be recalled that about this time last year the arecanut gardens in several parts of South Kanara district were in the throes of a devastating disease known as *Mahali* or *Koleroga*. To many ryots in South Kanara and South Malabar, arecanut is a money-crop while to a large section of the poorer ryots, it happens to be their sole means of livelihood. The disease is by no means new to the

district. The cause of the disease, the nature of its spread and means of combating it were investigated for over a quarter of a century. The disease is caused by a water-loving fungus (a tiny mould-like organism) which can flourish only during very wet and humid weather. It is for this reason that the fungus is active during heavy monsoon rains on the West Coast and for the same reason some garden owners are lucky to escape its depredations in some years when the monsoon is either weak or intermittent. The Department of Agriculture has realised the danger of ryots gambling with the monsoon and has advocated a pre-monsoon spray to the young arecanut bunches with a protective chemical mixture (known as Bordeaux mixture) as an insurance against the attack of the disease. The mixture on drying, adheres to the nuts in the form of a thin film which being injurious to the fungus, protects the nuts from attack. A second spray done about six weeks after the first affords complete protection. Though the cost of such operation works out at a small figure of Rs. 10 per acre per spray including the proportionate cost of a sprayer, cost of chemicals and labour, and is but a small fraction of the income from the crop, the operation involves some trouble and a small initial capital. The result was that despite sufficient knowledge on these matters there was a tendency even among well-to-do garden owners to gamble with the weather and to think of spraying after the outbreak of the disease.

Following the severity of the disease in South Kanara last season the intensive, departmental propaganda done in the district since last December has been amply rewarded. A special staff of two agricultural demonstrators and 10 field-men assisted by 30 climbers scoured the areas well in advance of the monsoon and educated public opinion in favour of carrying out remedial measures. During May and early June, they held demonstrations on ryots' gardens in several centres. Every effort was made by the Deputy Director of Agriculture and the Government Mycologist to organise the sale of sprayers and chemicals to ryots through official and non-official channels. Special mention may be made of the efforts of the Puttur Division Mahali Prevention Co-operative Society which was formed during the year with the specific object of supplying sprayers and chemicals to a large number of ryots in Puttur and Kasargod taluks. The great demand for sprayers facilitated imports and encouraged local manufacture.

Results of Propaganda work. On a modest estimate well over 50 per cent of the 18,000 acres in South Kanara was sprayed well in advance of the monsoon and about 90 to 95 per cent. of the total area was sprayed before stray cases of disease appeared here and there. It cannot however be claimed that the spraying has been perfect in all details. The jet spray which has a longer but narrower range of action is generally preferred by ryots to the fine misty spray. This is a compromise, resorted to in order to save time and labour, but results in a larger consumption of the mixture and less effective protection. Again there is a tendency among some ryots to add far more lime than is necessary. Despite these defects, it is a matter for gratification that spraying has been done in the district in a measure never attained before. The disease has been kept in sufficient check though the heavy and almost continuous rainfall received between the middle of June and the middle of August would have been conducive to a general outbreak. But for the protection afforded, the plight of the areca growers could easily have been worse than what it was last year. The situation in South Kanara may be summed up in the words of a prominent land-lord who writes: "Our faith in the present measures has become stronger and we are trying hard to attain perfection".

The situation in South Malabar. South Malabar was fortunate in escaping the severity of the disease during the last three years. Consequently there was a general relaxation in spraying. Premonsoon spraying was not done to the

same extent as in South Kanara. The disease appeared in some villages in Ponnani taluk where ryots started spraying after the nuts began to fall away. This is a case of avoidable loss since ryots in this taluk are thoroughly educated in the methods of spraying and have time and again learnt to their cost the results of such neglect.

Eradication of nut grass, a troublesome weed. It is a matter of common knowledge that the presence of weeds especially the nut grass (*Cyperus rotundus* commonly called *Korai* (in tamil) or *Thunga* (in telugu) affects the growth of the crops and reduces their yield. It is found in all types of soils but thrives very well in sandy and loamy soils. Its propagation is chiefly by the nuts which develop underground. The nuts are connected by slender wire-like stems resembling a chain branching in all directions. A single *korai* plant sometimes contains more than 40 nuts connected to it. The chains of nuts are mostly found in the top layers of soil up to a foot or a foot and a half in depth. Sometimes the chains extend down to even 3 or 4 feet. The weed robs the plant food and moisture intended for the crop and smothers their growth also in the early stages. Once it makes its appearance, it spreads easily and persists under all conditions.

At Palur Agricultural Research Station it was once a serious menace to cultivation of crops. Various trials spread out over a number of years were made eradicating this weed. These trials can be grouped into two main classes; cultural and cropping.

Best results were obtained by ploughing the fields soon after the harvest and thence cultivating them with *guntaka* or spring harrow until the sowing period. Every time the implement was worked the germinated *korai* plants with the nuts were uprooted and dried in the sun. When fresh nuts from the bottom came to the top, again they were uprooted at the next working of the implement. That such a fallow cultivation had a wholesome effect in reducing the vigour of the weed was evident by the presence of a smaller number of nuts after the fallow season in almost all the fields.

In regard to the effect of cropping on the weed, it depended on the kind of crop grown. Sugarcane, fodder cholam and paddy under puddled condition arrested the growth of the nut grass almost completely. In cumbu and other drill sown crops reduction was perceptible due to frequent hoeing by bullock power while groundnut encouraged the increase of nuts as no intercultivation was practicable a month after its sowing.

It was also found that when the percentage of nuts under a two, three and four year rotation was worked out, the fields under 4 year rotation were much less weedy than those under the two or three year rotation.

From the above it is recommended that immediately after the harvest of the crop the field should be ploughed and *guntaka* should be passed once a fortnight to uproot and expose the nut grass. This should be continued till the time of sowing. A judicious rotation of crops which allows frequent intercultivation, is to be followed to effectively bring this pernicious weed under control.

Tomato Cultivation. Tomato as a vegetable has recently come to the forefront and the demand for the same is on the increase. People seem to realise value of vitamins in human nutrition and in view of its containing vitamins A, B and C in plenty, it should become more popular. As it contains very little fibre it is easily digestible and is also rich in protein contents. When ripe, it can be eaten raw and hence it serves both as a fruit and as a vegetable.

This vegetable can be successfully grown in all places and in all types of soils but sandy loams are preferable. On the plains, sowing can be started from June up to September. Again nurseries can be raised just after the north-east

monsoon rains are nearly over in December. The land should be heavily manured with well-rotten cattle manure and incorporated in the soil a month or two before planting.

There are many varieties of tomatoes and seeds can be obtained from any seedsman of repute. Three to four ounces of seeds are sufficient to plant an acre. The seeds may be sown in nurseries prepared as for ragi and the seedlings may be pulled out and transplanted when they are 25 to 30 days old. Ridges should be formed 3 or 3½' apart and the seedlings planted along the ridges 2 feet apart. Tomato plants have flexible stems and require artificial supports to grow erect. Stakes 5' or 6' in length may be driven 6 feet apart along the ridges and thin or split bamboos may be tied horizontally to train the branches. The soil should be intercultivated as frequently as possible to keep it free from weeds. Spraying with bordeaux mixture twice or thrice during the early stages checks diseases and acts as a repellent for several insects. Copious watering is quite necessary to get the maximum yield. It is better to allow the fruits to ripen on the plant itself, but for marketing it is advantageous to harvest the fruits when they are just ripening as they keep longer if done so. Under normal conditions the yield varies from 15,000 to 20,000 lb. of ripe fruits per acre. In villages near towns and cities, this vegetable can be cultivated and marketed easily. A net profit of about Rs. 150 to Rs. 200 can be obtained from an acre.

Market Surveys. The public are probably aware of a series of marketing surveys that are being conducted in this Presidency in line with the All-India Scheme to study the present marketing conditions of agricultural commodities and to suggest ways and means to improve them. All available statistics have been collected regarding production, consumption, net surplus, movements internal and external, trend of prices, methods of marketing, market and transport charges etc., of rice, wheat, linseed, groundnut, tobacco, fruits like oranges, pineapples, apples, and plantains, cattle, eggs, hides and skins and milk. These reports will be published shortly after they have been compiled and reviewed by the Agricultural Marketing Advisor to the Government of India, Delhi.

A few notes on some of the commodities surveyed may be of interest to the public.

Plantains. The average area under this crop in this Presidency during the last five years was 1,47,000 acres. The area has increased by 30,000 acres during the last 20 years. Nearly 35 per cent. of the area is in Malabar. It has, however, very little export trade. The annual estimated production in the Presidency is nearly 9 lakhs of tons of fruits valued at 441 lakhs of rupees. The largest exporting district is Trichinopoly which exports annually 5.5 lakhs of maunds of plantains by rail alone.

The maximum production of fruits is during December to March in all growing areas for *Poovan*—Telugu (*Karpura Chakrakheli*) April to July for *Rasthali*, October—November for Mauritius and throughout the year for hill plantains. *Nendran* is special to the west coast and the main season of its production is August—September.

The demand for plantains is mostly from the towns in this Presidency, Madras alone receiving by rail annually about 3.5 lakhs of maunds from many sources. The exports to other provinces and states annually amount to about 8,000 tons mainly to Mysore State and Hyderabad.

The prices of plantains were at their lowest during 1934-35. Prices have since improved slightly. For the *Poovan* variety there is a rise in prices during July to October and a fall from December to March when production is at the maximum. Mauritius fruits (*Pachavazhai*) show increase in prices in March—April and July—August. *Rasthali* shows a fall from April to May and a rise in July.

Of all the varieties, *Nendran* and hill plantains have the best keeping quality. *Poovan* comes next. *Rasthali* and *Chakrakeli* have poor keeping quality.

Although the export trade at present is only about 8,000 tons annually there is a large surplus for export if facilities are available. A large proportion of this surplus is at the mercy of the merchants and commission agents. Special railway rates exist from Trichinopoly plantain area to Mysore State; special wagon rates have also been introduced from Cauvery and Godavari areas for traffic by passenger trains to cities in North India. But still the rate works out to two to three times the cost of the plantains at the producing area and consequently the traffic to North has not improved.

The margin of profit between the different agencies engaged in plantain trade shows that the grower gets only 33 to 50 per cent. of the price paid by the consumers. The retailers' profits are fairly—20 to 30 per cent. according to the variety.

There is thus a real need for the improvement and development of the plantain trade. A lot can be done in this direction by the producers organising themselves on the lines of the Fruit Growers' Association in California. This will certainly improve the trade and bring in more money. The marketing staff attached to the Agricultural Department, Madras, will render all assistance and guidance for the formation of growers' associations and in better methods of marketing and distribution of produce. Notes on other commodities will follow.

Gleanings.

Salt Prevents Ill Effects of Heat. A serious problem to many of the important industries of the country is the effect of extreme heat on employees. In mills and factories where of necessity high temperatures exist the problem of heat cramps and heat prostration is especially acute. Cramps and prostration however are frequently met with in hot months of summer where workers are unprotected from the direct rays of the sun and for that matter, even in mills where the temperature is lower than that of the outside air.

The use of salt as a remedy and preventive measure in such cases is several decades old, but only recently has its effectiveness been scientifically proved by successive trials. One of the most recent and thorough investigations of the value of salt as a heat prostration preventive was made by the Fatigue Laboratory of Harvard University, conducting experiments both at home and in the field. More than five years were spent in gathering data on the physiological and pathological effects of high temperature on workmen.

Dr. Arlie Bock, who is connected with the Harvard Fatigue Laboratory, suggests that a worker, working eight hours a day under extreme heat, should use plenty of table salt with his food and also should take five or six one gram tablets of salt, enteric coated to prevent dissolution before the tablet leaves the stomach.

Salt tablets solve prostration problems. Since salt tablets have been made available several automobile plants have not had a single case of heat exhaustion. The tablets each containing one teaspoonful of pure sodium chloride, are available at drinking fountains in many of the factories. They are swallowed whole, followed by one or more glasses of water. Holding that the principal cause of heat exhaustion is the loss of salt from the blood stream through profuse perspiration, Dr. E. R. Harris, Physician at the Cadillac motor car plant is urging shop workers to take from 10 to a dozen of the salt tablets daily.—Henry C. Marble, M. D., Surgical Director, American Mutual Liability Insurance Co. (*Scientific American*, September 1937.)