may point out in this connection that no information to show what money return can be expected from the cultivation of cinchona is available in the report, although this is an all-important factor, at least as far as the private planter is concerned whether large or small. The cost of production is however given in detail; a statement of the prices paid for bark, or the unit price that has ruled for the last ten years or so, will have greatly added to the usefulness of the report. We should also like that analyses had been given of the soils of certain Anaimalai estates where bark with a high quinine content of 11% was being produced, and likewise of the soils of the Tavoy plantations which are stated to have been a disastrous failure although the area was selected by one of the greatest experts in cinchona.

The species *ledgeriana* is the one recommended to be grown. It is gratifying to learn that 72% of the cinchona grown in India at present is *ledgeriana*, and that among these some extraordinarily good areas may be seen. The need for research is emphasised on the famous Java model and a strong plea put in for a research station for isolating better performing strains of *ledgeriana*, for their multiplication as plants on their own roots or grafted on to *succirubra* stocks, for nursery technique and so on. Such a station is in our opinion long overdue.

Much has been accomplished even as the result of grafting the *ledgeriana* on to the less exacting *succirubra* in Java, a comparatively easier line of work which we are told is being done with great facility by ordinary coolies trained for the work, at the rate of some 300 to 500 grafts per day for a set of two coolies; it should be possible to undertake this work at least straightaway on the present Government plantations themselves. It is stated that this was attempted but was not persisted in. The point is further stressed that unless this better species and better yielding types among them are grown, it will not be possible to reduce the cost of production. This cost of production will probably be the rock on which schemes of expansion and continuance will split; motives of self-sufficiency are not likely to stand the strain of the ever present and insistent claims for economy, especially if large supplies of cheaper quinine should be available from Java or other foreign sources. The lines of expansion indicated in the report are cautious and sound: we hope suitable action will soon be taken to give effect to the recommendations. (*S. K. Y. in Current Science*, Vol. 8. No. 9 September 1939).

Gleanings.

Spraying and Photosynthesis. The application of a spray fluid for the control of insects or fungi has usually been regarded solely from the pathological point of view. R. A. Hyre has shown, however (Cornell Univ. Agr. Exp. Sta. Memoir 222, Ithaca, N. Y., April 1939), that certain sprays lower the photosynthesis of the plant to which they are applied. Lime-sulphur may even reduce it by as much as 28 per cent at ordinary summer temperatures, but Bordeaux mixture, on the other hand, has little effect. Emulsified sulphur pastes were found to be intermediate in their effect upon photosynthesis. Respiration was not markedly affected by spray fluids. Studies upon such factors as the biennial bearing of tree fruits show that these plants cannot sustain any considerable loss of photosynthesis with impunity. The loss in anabolism through spray applications is not of many days' duration but it is likely to occur at the critical time of flower bud formation, when the extent of the subsequent year's crop is being determined. The use of Bordeaux mixture instead of lime-sulphur in the summer spray programme would provide a practical means for the achievement of pathological control without physiological disturbance. (*Nature*, Vol. 144, No. 3644, Sept. 2, 1939, p. 447-448).

The Control of Silver-fish. Silver-fish, at times, cause serious damage to the surfaces of photographs, book-covers, wall papers, starched clothing, linen and other materials. They shun the light, and unless disturbed are not often seen during the day. Cupboards and book cases, etc. which are not frequently used, provide shelter and breeding grounds for them.

Silver-fish are wingless insects and are covered with smooth, glistening scales, which in the common house species (*Ctenolepisma longicaudata*) are silvery grey in colour. The whitish eggs are small and rounded, and the young forms resemble the adults.

Control. Where silverfish are known to congregate in numbers and are readily reached by a spray, a kerosene-pyrethrum mixture (or fly spray) may be used.

The spray mixture may be prepared with the following materials :—

Pyrethrum powder.	...	...	4 oz.
Kerosene.	...	...	1 quart.
Methyl salicylate (synthetic oil of wintergreen).			¾ fluid oz.

Place the pyrethrum powder in the kerosene, mix and shake well, then allow to stand for about twelve hours. Strain through fine muslin and add the methyl salicylate, after which the spray is ready for use.

A poison bait which has been found effective in controlling silverfish may be prepared with the following substances :—

Flour.	...	...	...	1 oz.
Sugar.	...	...	...	1½ oz.
Barium fluosilicate.		...	...	1¼ oz.
Water.	...	...	...	½ pint.

To prepare, make the flour and sugar into a paste with the required amount of warm water and then stir in the barium fluosilicate.

The baits are readily prepared by spreading the poisoned paste with a paint brush on sheets of thin cardboard, about two feet square. Both sides of the cardboard should be painted, and when dry, cut up into small pieces measuring about two inches by three inches.

From 10 to 20 baits are used in an average-sized room, and they should be left undisturbed in parts where the silver-fish are usually seen. The baits should be kept out of the reach of children. "*The Agri. Gaz. N. S. Wales*", Vol. L, (1939) : 438.

A Simple Ant Bait. During the past three years very satisfactory results have followed attempts to clean up invasions by the small black ant, *Iridomyrmex rufoniger*, in houses in Sydney, by baiting with a relatively simple mixture of honey and arsenic. The bait is made by mixing :—

				By weight.
Arsenite of soda (80 % As_2O_3)		...	...	1 part.
Water.	...	...	...	16 parts.
Honey.	...	...	...	288 parts.

These proportions are most easily arrived at by stirring thoroughly into 18 oz. (by weight) of honey, 1 fluid oz. of a solution of arsenic containing 1¼ oz. of the arsenite of soda per imperial pint.

Commonly recommended baits for sweet-eating ants almost all contain very much more water than the above mixture and usually contain preservatives. They are more complex to prepare. Some at least lose their toxicity or attractiveness as a result of a mould growth when kept in partially-emptied bottles

Samples of the simple honey and arsenic bait stored for eighteen months in half-filled bottles grew no mould (presumably because of the high concentration of sugars), retained their odour of fresh honey, and were readily eaten by small black ants. As with freshly prepared bait, the colonies of ants observed fed on 18-months-old mixtures for some few hours and then disappeared. A small teaspoonful of the bait, or the amount adhering to half a dozen wooden matches dipped in it, was enough to give the desired result in several houses in Sydney. It is suggested that no more need be offered to any colony at a time. The amount of arsenic in a small teaspoonful of bait is approximately equal to a large medicinal dose for a human being (one-sixteenth of a grain). This honey-arsenic bait is not attractive to the small red ant, *Monomorium pharaonis*.—R. N. McCulloch, Assistant Entomologist in (*Agri. Gaz. of N. S. Wales* 50 (1939): 348).

Correspondence.

To

The Editor, Madras Agricultural Journal.

School Gardens.

Sir,

In the matter of School gardens, India is at present far behind other countries. In America and England they are found scattered all over the country. In a country almost wholly agricultural like India, the children should be taught not merely the ordinary indoor curriculum of the elementary school but advantage should be taken of the child s longing for the open air and for playing at work, to develop its powers of observation and the acquiring of practical information from the material provided in the school garden, for arithmetic, mensuration, drawing composition and nature study in a living actual form. A good many people look upon school gardening as having for its object the cultivation of a few vegetables and flowers and nothing more, Even so, it would be of some value in teaching the boys and girls to be neat and methodical, useful and resourceful. The possibilities and usefulness of a school garden, however, are far greater than this, The school garden teaches the children to become interested in plant life, to use their hands while realising that it is not undignified to work and to take a new interest in their surroundings. It also enables them to add fresh and often new vegetables to the home supply or to obtain a little money from their sale, as a result of their healthy out-door work. In other countries, it has been found that the school garden course has developed the children physically, mentally and morally, turning out healthy, bright and quick-witted children.

The training that a boy has received in the ordinary village school garden, even supposing that he is not going to earn his living as an agriculturist, will have developed in him the habits of industry, economy, thrift, method and resourcefulness and will have sharpened his powers of observation.

Some of the more important uses of school gardens are, to serve as object lessons in the cultivation of useful plants, to encourage children to establish gardens at their homes. If tackled in the proper way, the school gardens might serve as centres for the distribution of useful seeds of improved varieties of common seeds, together with information about them to induce the cultivator parents to take up the cultivation of a new or improved variety.

With land and labour available in the schools, it is now possible to start a garden which will repay its cost many times over owing to the cheapness with which seeds of excellent varieties are now available from seedmen. A

succession of the most favoured and easily maketable vegetables such as radishes, lettuce, cabbage, brinjals, amaranth etc., can be grown. Wherever the school garden exists, the children are being instructed in laying out plots, in recognising various seeds and weeds, the different useful grasses, and the useful and destructive insects and birds of the garden. The value of this branch of training is already shown by the interest it has aroused among the children and the willing co-operation which has been forthcoming. It is hoped that the Educational authorities will see their way to inducing more schools to maintain school-gardens.

In a few cases, it has been found that the parents of children attending the school look upon manual labour with contempt, they should know that it is just those countries where manual labour has never been looked upon as a bar to advancement that are the most advanced and wealthiest.

Thyagarayanagar,
Madras, November 1939.

Yours &c.,
S. Sundararaman

Research Notes.

The Yam leaf beetle

Galerucida biclor Hope, a pest of elephant foot yam (*Amorphophallus companulatus* Bl.) Elephant foot yam is subject to the attacks of two insect pests—*Galerucida bicolor* (Fam Chrysomelidae) and *Hippotion celerio* (Fam. Sphingidae). Of these the former does some serious damage to the crop; in some years the loss due to the insect is said to be about one third of the total crop. The grubs feed on the leaves and at times the entire stems are also attacked. The adult beetles also feed on the leaves and make holes in them. The pest has been noted to feed under laboratory conditions on Colocasia also. It has been recorded from Malabar and Godaveri in the Madras Presidency and also from United Provinces, Dhera Dun, Nepal, Assam and Burma.

Eggs are laid in clusters in the soil at a depth of about an inch. The egg measures one mm. long and 0·75 mm. broad and is yellowish brown in colour, spherical in shape and sculptured. When about to hatch it turns shining and creamy white in colour. The egg period is about 7 days.

The newly hatched grub measures 3 mm. long and one mm. broad. It is pale black in colour and bears hairs and warts on the body. The grub feeds on the leaves of the food plant. The first moult is 5 to 6 days after the hatching and the second 4 to 5 days after the first moult. In 4 to 5 days after the second moult the grub enters the soil for pupation. Pupation is inside an oval chamber at a depth of an inch. The larval period is about 13 days.

The pupa is pale yellow in colour and measures 6·5 mm. long and 3·5 mm. broad. The pupal period is 8 to 9 days.

The adult beetle measures about 7·5 mm. long and 5 mm. broad. The general colour of the beetle is brown with black spots and patches on the dorsal and ventral surfaces. A description of the beetle is given by Maulik in Fauna of British India, Coleoptera, Chrysomelidae, (Galerucinae) pages 554 to 556.

Handpicking of the grubs and adult beetles was tried with success. Other methods such as dusting with arsenicals are under trial.

4—12—1939,
Ag. Res. Institute, Coimbatore.

M. C. Cherian,
N. Krishna Menon.