

## A DISEASE OF SALVIAS

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**S***ALVIA farinacea*, which forms a prominent feature in many up and mid-country gardens, has of recent years become so seriously affected by a disease that its cultivation is reluctantly being abandoned in many gardens. The disease spreads steadily through the beds and causes the leaves to become unsightly and the flowering stalks dwarfed.

The first indication of the disease is always to be found in the young expanding leaves. They are usually somewhat dwarfed and always mis-shapen, being twisted or curled. As the leaf opens from the bud, small blackish brown spots are to be seen on the leaf blade, but as the blade expands the discoloured areas drop out leaving small holes. The perforated leaves are characteristic of the disease. Distortion results from the uneven expansion of the leaf owing to the presence of dead areas which become holes. Leaves fully expanded before the disease starts never develop any of these symptoms.

*S. farinacea* is normally propagated in Ceylon by splitting the root stock and it has been a common experience that where plants from a diseased bed are used for cuttings the resulting plants are heavily diseased. Moreover casual observation indicated that a plant which had acquired the disease rarely, if ever, recovered. This observation was later found to be incorrect as cuttings from diseased plants will develop healthily if protected from certain insects.

Similar symptoms have also been observed on other species of salvia particularly the scarlet and blue bush varieties. These are also commonly propagated from cuttings and affected bushes as a rule steadily become worse without any sign of recovery.

These casual observations gave rise to the view that the disease possibly was of virus origin. A virus disease of salvias

has been described in America, but its symptoms differed in some respects from those observed in Ceylon, particularly as regards the perforation of the leaf which is characteristic of the Ceylon Salvia disease.

Mr. T. H. Parsons, Curator of the Royal Botanic Gardens, Peradeniya, kindly supplied me with seed obtained from disease-free plants under the names *S. (pseudo) coccinia* and Scarlet Salvia (*S. splendens*). These were germinated and planted in pots in the laboratory where they developed into normal healthy seedlings. Numerous attempts were made to infect these seedlings in various ways with sap from diseased *S. farinacea* and scarlet salvia plants, but all attempts failed. Other attempts were made to transmit the disease by means of aphids and white flies collected after feeding on diseased specimens, but also without success. The plants used in these experiments continued to produce normal leaves with no indication of disease. Six weeks later they were cut back. The new shoots which were produced later were healthy and remained so until the plants were discarded.

While the above experiments were in progress a few scarlet salvia plants, which for some time had produced diseased leaves only, developed a few normal leaves. These leaves remained normal though later-formed leaves became distorted. Nearby plants of *S. farinacea* did not produce any normal leaves at that time. The observation on the scarlet salvia plants, however, suggested that the disease symptom was not as permanent as had been imagined and that the observed symptoms might be the result of injuries made by a large sucking insect.

Later, a green Capsid bug\* was observed resting on a leaf of a scarlet salvia plant. This was caught and a search made for others, but only two more were found. These three insects were allowed to feed on fully expanded leaves of scarlet salvia seedlings. All bugs died within 48 hours although they were observed to feed. No injury was observed to occur on the leaves on which the insects had fed and the later growth of the seedlings was healthy.

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\*Kindly identified by Mr. G. M. Henry, Colombo Museum, as *Lygus viridanus* Motch.

The next 3 Capsid bugs caught were placed in an insect breeding cage with three well-grown seedlings so that the insects had freedom to move about and feed where they wished. Two days later the bugs were dead and were removed from the cage. The terminal bud of each plant was injured, and the typical blackish brown spots could be seen on the outer leaves. On expansion, these leaves became distorted and perforations appeared where the spots had occurred. In short, the plants exhibited the same symptoms as observed in nature. Leaves which expanded during the next 17 days were normal and remained so, but at the end of that period the terminal buds were again observed to be injured as before. The injury this time was found to be associated with the presence of young, very immature bugs. These evidently were the offspring of the bugs originally put in the cage.

This experiment has been repeated on several occasions with similar results, and in no instance have the symptoms of the disease failed to develop when the Capsid bugs have been allowed free access to the growing shoots. The first indication of bud injury could usually be observed about 24 hours after introducing the Capsid bugs. The adult bugs failed to survive more than 4 or 5 days, but all leaves injured in the bud during that time became distorted and perforated, whereas leaves developed in the absence of the adult bugs or their offspring expanded normally. In those experiments in which the young were allowed to remain to feed on the seedlings the injuries were very severe and growth became stunted.

All plants which had been attacked by Capsids during the course of these experiments were later cut back below the damaged leaves and protected against further attack. In all cases the later growth was normal and healthy.

At the same time root cuttings of severely diseased *S. farinacea* were made and protected against insect attack. A number of the cuttings failed, but all that struck developed healthy undistorted leaves. This proved that the disease is not carried in the root stock as was originally suspected but is dependent upon external agencies.

The above experiments clearly indicate that the symptoms observed in the gardens are the result of attacks by this

particular insect and that the problem of control is an entomological one. No attempt has been made by the writer to study the life history or bionomics of this insect. During the above experiments it was ascertained that the female deposits her eggs below the epidermis of the leaf petioles as a rule. On hatching, the young are very active; they run up and down the stems but feed on the terminal or lateral buds where they cause severe injury.

The adults are very active and leave the plants on which they may be resting as soon as they are disturbed. The flight is rapid and so escapes notice particularly if there are a few flies of various sorts on the plants as is usually the case. At no time were the adult Capsid bugs abundant on the affected plants, but it will be realized that a free-moving insect like this can do considerable damage by feeding on different buds. Nor have young bugs been found abundantly. More have been seen on the plants used in the experiments than have been found on the more numerous plants in the garden. This raises the question whether the eggs are not more frequently deposited in nature on other species and that the damage to *Salvias* is done mainly by the adults. Similar injuries have been observed on other plants belonging to other genera than *Salvia* (e.g., *Crotalaria usaramoensis*), but without further investigation one cannot state with certainty that they have been caused by the same species of insect.

Not all species of salvia are attacked. *S. leucantha*, the blue-flowered species with white hairy stems and lower leaf surfaces, has not been observed to be attacked though growing in close proximity to *S. farinacea*. Possibly the hairy nature of the young shoots affords protection. It was noted during experimental infection that the relatively glabrous *S. splendens* was as a rule more severely affected than the more hairy *S. pseudo) coccinea*. *S. patens* has not been found to be attacked.

I am indebted to Mr. C. A. Loos for the accompanying photographs illustrating the symptoms as they typically occur in nature on *S. farinacea* and Scarlet Salvia, and for the care with which he supervised the experiments here described.