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CONTROL OF SUGARCANE PYRILLA IN SIND

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ABSTRACT : *Pyrilla perpusilla* Walker that was first noticed in early fifties in Tando Mohammad Khan now appears to have established in Nawabshah, Mirpurkhas, Hyderabad and Badin Districts of Sind province. Surveys suggest that pyrilla has been checked considerably through egg parasites in Mirpurkhas, whereas in certain pockets of Nawabshah, the parasites are not equally effective. Existing sugarcane varietal complex and high nutritive inputs in commercial plantations in Nawabshah appear to be conducive to pyrilla. Measures to keep the pest population in check are suggested.

Key Words: Sugarcane; Pest Insects; Insect Control; Pakistan.

INTRODUCTION

In Sind, pyrilla was first observed in early fifties in Tando Mohammad Khan where it was introduced alongwith sugarcane variety 'Co-622' brought from North West Frontier Province. Since then, there are reports of its incidence in different sugar mill plantations. There were reports of serious pyrilla insurgence from almost all the sugarcane growing areas in Sind, particularly from Nawabshah and Mirpurkhas.

With the increase in cultivation of sugarcane, the cane traffic from one district to another and from one province to the other has also increased. Moreover, the cane for crushing is regularly moved from one zone to another and all these zones are contiguous throughout the country. Thus, this evil is inevitable consequence of sugar industry. Establishment of pyrilla in Sind, therefore, necessitates adoption of other control methods besides routine quarantine measures.

Pyrilla perpusilla Wlk. (Lophopidae : Homoptera) was originally considered endemic to India, and damaging populations were reported from Madhya Pradesh, Behar, Maharashtra and Rajasthan (Butani, 1964). It has also been reported from Afghanistan (Cotterell, 1954), Sri Lanka and Thailand (Fennah, 1969) and from Nepal (Neupane, 1967). In Pakistan, it is serious in N.W.F.P. and also occurred in the Punjab (Khan and Khan, 1966; Khan, 1967; Wajih, 1967, and Qayyum and Ahmad, 1978). Makhdoomi and Bhatti (1978) have discussed the scope of biological control of pyrilla, while Mohyuddin et al. (1982) reported six species of egg parasites from Punjab and N.W.F.P.

With the increase in the intensity of sugarcane cultivation, this insect now appears to have established in Nawabshah, Mirpurkhas, Hyderabad and Badin districts alongwith some egg parasites.

Pyrilla has a number of graminaceous hosts besides sugarcane. These alternate hosts include economic grain crops such as wheat, barley, oats, maize, *jowar*, *bajra*, paddy in addition to many monocotyledonous grasses; kans *(Saccharum spontaneum)* being most important for over-wintering of small populations found between February and March (Fennah, 1969). On maturity of heavily infested fields of sugarcane towards the end of winter, (February and March) nymphs and adults have been found to shift to neighbouring wheat fields. Pyrilla, however, passes a partial generation on wheat. Recently in Nawabshah, pyrilla has been observed to deposit eggs in the cracks under the barks of trees like *sheeshum (Sisso dalbergia)*, *nim (Melia indica)*, mango *(Mangifera indica)* and kikar *(Acacia indica)* adjoining heavily infested mature sugarcane fields. Most of the eggs failed to hatch, and nymphs from negligible number

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of eggs died due to starvation. This phenomenon appears to have resulted from oviposition stress.

MATERIALS AND METHODS

Biology

Misra (1917), Qadri and Aziz (1950) and Gupta (1953) have covered different facets of its life cycle; the literature is quite extensive and has been reviewed by Butani (1964) and Fennah (1969).

Pyrilla adults start reappearing in sugarcane fields from the end of March and continue till July-August. There are five nymphal stages. Female lay eggs in clusters of 30—40 and may deposit 600—800 eggs during her life time. Eggs hatch in 7—10 days and total life may take about 30—40 days.

Survey

Surveys conducted in Nawabshah and Mirpurkhas districts during 1982 indicate that pyrilla is checked to a considerable extent by egg parasites in Tando Ghulam Ali and Kachelo (Mirpurkhas). Parasitism during the grand growth period of the cane (July—September) ranged from 30—80 percent. In contrast, there are pockets in Nawabshah where pest population overcomes this natural check.

Apart from details of biology and methods of control, the immediate problems to find solution are, whether a species in one area is likely to become serious in any other area into which it might inadvertently be introduced, and whether the changes that accompany modern trends in sugarcane agronomy are likely to increase the risk of damage by species already present. The relationship between pyrilla and their local biological environment is too complex to permit meaningful generalization, but the weather conditions associated with out-breaks of pyrilla show similar features as does the type of damage sustained by the host plant.

Pyrilla has been kept under watch during the last three to four years in Nawabshah. It appeared in small pockets which were purposely left without any control measures so as to observe the effect of natural forces already in vogue. Since parasitized pyrilla eggs with history of occasional out-breaks of short duration were collected during August 1982, it appears that the pest and the natural enemy both appear to have established simultaneously in these localized pockets.

Wherever pyrilla population was low it was kept under check through the egg parasites. The pest gained high population level on isolation from the parasites, the former being comparatively more mobile. Wherever conditions are favourable for egg parasite, the pest was under check with a lag of about 20 days. This lag being the difference between the pest oviposition and parasitization of the eggs. For the first two to three years, infestation subsided and shifted in this way in certain pockets of Nawabshah. With the increase in the area of cultivation, it appears that the environmental conditions are not as conducive to egg parasites as they were in the beginning.

RESULTS AND DISCUSSION

The increase of area under cultivation brought with it a change in varietal complex which responds well under high nutritive inputs. These two accompanying factors appear to have greatly influenced the natural balance.

These studies of infestation have previous history of pyrilla damage when 'BL-4' was the first victim in early seventies. During a survey in August 1982, pyrilla population in Nawabshah was very heavy on 'L-62/96', serious on 'BL-4' and alarming on 'L-126'.

There has been two phases of varietal changes in Nawabshah during the last decade. The first change in mid seventies was from 'CoS-245', 'Co-547' and 'CoL-54' to 'BL-4'. This meant a change from narrow leaf varieties to broad leaf varieties.

It was about this time that Mehta and Verma (1976) reported that pyrilla preferred

broad leaf varieties, therefore this shift had been more conducive to pyrilla. The second varietal change already in progress comprises of 'BL-4', 'L-113', 'L-116', '-L-126' and 'L-62/96'.

Presently, 'BL-4' occupies about 45 percent area under sugarcane, while 'L-116' and 'L-113' occupy about 50 percent area in Nawabshah. 'L-116' and 'L-113' have narrow leaf while 'L-126' and 'L-62/96' are medium leaf varieties and 'BL-4' has broad leaves. Particularly after August 1982 survey, there is a great need for thorough checking of the new commercial introductions for their susceptibility. A comparison of 'L-62/96' and 'L-126' with 'L-116' and 'L-113' (narrow leaf commercial varieties) is needed for future planning. Apparently, narrow leaf 'L-116' and 'L-113' have an edge over medium leaf varieties, i.e., 'L-62/96' and 'L-126'.

Fertilizer use, being basic input to commercial cane cultivation is increasing. Nitrogenous fertilizers result in high sucrose and alfa-amino-N concentration being conducive to pyrilla population (Fennah, 1969). Since high fertilizer inputs cannot be avoided in commercial plantation, a balanced formula has to be developed for high nutritive varieties. Sugarcane demands 224 kg of nitrogen, 84 kg of phosphorus and 168 – 224 kg of potash per hectare. In actual practice, nitrogenous application is not balanced and it is invariably high as compared to P and K, whereas K is totally neglected. In contrast to alpha- amino-N, K_2O in plant concentration is responsible for lignification and hardening of cells and if both N+K are applied in balanced form, the effect of alpha-amino-N on the increase of pyrilla population may have a counter influence. The fields with known pyrilla history may, therefore, be given balanced quantity of nitrogen and slightly more of potash.

In addition, there are two sowing seasons, i.e., autumn (September and October) and spring (February-March) and the crop is ratooned over. With the crushing season now extending upto June, all stages of crops are available.

Several parasites and predators like *Epipyrops melanoleuca* Fletcher as adult and nymphal parasite; *Ooencyrtus papilionis Ashmead, Tetrastichus pyrillae* Crawford, *Anagyrus* sp. and *Platygaster* sp. as egg parasites ; *Brumodies suturalis* (F.); *Menochilus sexmaculatus* F.; *Coccinella septempunctata* L. and *Chrysopa* sp. are reported from Punjab and N.W.F.P. to be active and effective control agents (Mohyuddin et al., 1982).

However, introduction of *E. melanoleuca* as adult and nymphal parasite and *V. allardi* a general predator in Sind from Punjab is under active consideration of the Sind Sugar Industry Research Institute and it will soon be introduced.

It may now appear that the pyrilla control in sugarcane plantation is multifaced and complex. Each particular situation demands a different strategy. Some of the important recommendations formulated to control pyrilla are :

a) Internal local quarantine must be practised as a general rule and infested crops should not be used for seed purposes.

b) Raising of fodder crops like *jowar* and maize should be discouraged in the vicinity of sugarcane, as they harbour pyrilla and serve as a source of re-infestation.

c) The pockets where pyrilla infestation has faded out on its own, indicate substantial activity of enemies of the pest. Such pockets should be maintained as natural reservoirs so as to expand the sphere of activity of predators and parasites over a larger area.

d) Parasitized egg masses of pyrilla should be removed from the fields where pest infestation has declined and may be placed in the fields where infestation is building up. These eggs may be kept in wire-gauze cages or nylon nets which may prevent the exit

of the nymphs and permit the exit of tiny egg parasites.

e) Varietal complex of narrow leaf commercial varieties may be developed in a way that such varieties may strike a balance with broad leaf varieties. Overwhelming acreage of broad leaf varieties is likely to harbour more severe pest infestation.

f) Growing of broad leaf varieties should be avoided under water-logged conditions. The cane fields situated in water-logged areas should regularly be surveyed and necessary control measures should be taken immediately if found infested.

g) Soil analysis, wherever possible, be carried out by the farmers and fertilizers may be applied accordingly. Nitrogen fertilizer should be applied in balanced quantity in plots that have the history of pyrilla infestation. Application of higher nitrogenous fertilizers results in excess concentration of alpha-amino-N in leaves, which is conducive to pyrilla population build up.

h) Potash application should be advocated on the basis of soil analysis and its doze should be increased in the areas where pyrilla populations have been noted. K_2O is responsible for hardening of cell and balancing the proper utilization of N and P fertilizers thus avoiding the excess of alpha-amino-N.

i) If the pyrilla population is high in the unharvested cane fields, the periphery of such fields must be sprayed. Ratoons and fall-planted crops in the vicinity of high infestations must be thoroughly sprayed.

j) Lastly, research programme to study the interaction of different biotic and abiotic factors on the population dynamics of pyrilla should continue for which Sind Sugar Industry Research Institute has already taken an initiative.

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