

POPULATION FLUCTUATIONS OF APHID PESTS OF *CHROMOLAENA ODORATA* (*EUPATORIUM ODORATUM*) IN KERALA

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Chromolaena odorata Linn. is a native of South America from where it has spread to other parts of tropics. At present the weed population has reached alarming proportion all along south-western regions of India. For the control of the weed, biological method seems to be more desirable. Studies on the indigenous phytophagous insects associated with the weed showed that the aphids were most widespread and dominant in Kerala. Information on the population fluctuations of the aphids is necessary to formulate the bio-control strategy of the weed and the present studies were taken up in this context.

Materials and Methods

A detailed survey was conducted in Trichur district from November 1980 to October 1981. Stratified multistage random sampling was adopted for the survey. The villages of the district were listed out and these were classified into two groups, namely plains and medium hilly areas. From each group, four villages were randomly selected. In the selected villages, two localities with abundant weed growth were marked out in partially shaded situation and the other in direct sunlight. Three plots each of 2m² were chosen and a random sample of five plants was selected from each plot for taking observations. The aphid populations and nature and intensity of infestation were recorded at monthly intervals. Intensity of aphid attack was calculated by working out the percentage of crinkled leaves in the plant. The population fluctuations of aphid predators were also recorded for undertaking correlation studies.

Another survey was carried out in five other districts of Kerala namely Palghat, Malappuram, Ernakulam, Idukki and Kottayam during January 1981.

For comparing density of population and intensity of aphid attack, the analysis of variance technique as described by Snedecor and Cochran (1967) was employed. Before analysis, $\sqrt{x+1}$ transformation was made in order to effect normality. The significance of difference between medium hilly areas and plains was tested by using the students' 't' test.

Results and Discussions

The common aphid species occurring on *C. odorata* were *Aphis spiraeicola* Patch, *Aphis fabae* Scopli and *Brachycaudus helichrysi* Klth. These aphids were earlier recorded on the same weed (Joy *et al.*, 1979).

Aphis spiraeicola

These are pale green in colour and both apterous and alate forms were recorded. The populations of alate forms were negligible as compared to the apterous forms.

There was no significant difference in aphid population between different villages in medium hilly areas and plains. The population densities in unshaded and partially shaded conditions did not differ significantly. In medium hilly areas, the population of aphids was significantly higher in July than in all other months. Moderate populations were recorded in June, August and September. In October, November and May, the populations declined sharply. In December, January, February, March and April the aphids were very sparse. In plains also, the populations were at peak in July as compared to all other months, except June and August. There was a sizeable population during September and October and a lower population in May. During November, December, January, February, March and April the aphids were either absent or sparse.

Aphis fabae

Alate and apterous forms of this dark greenish aphids were present. There was no significant difference in *A. fabae* populations occurring in different villages in medium hilly areas and plains. In the case of different months in medium hilly areas, the populations attained a peak in July and this was significantly higher than all other months. During June, August, September and October the populations were sizeable. In May, the populations declined drastically and in November, December, January, February, March and April the populations did not exist.

In the plains, there was maximum aphid populations during July and August followed by June and September in that order and these were significantly higher than all other months. There was no significant difference in aphid populations occurring in medium hilly areas and plains.

In both species of aphids, maximum population was recorded in July followed by June, August, September and October. The present studies clearly establish the preference of the aphids to high levels of relative humidity and low temperature situations experienced during these months. Pirone (1978) recorded a high infestation of *A. spiraeicola* on spirea plant in late June and early July. The stage of the weed is another important factor regulating the abundance of aphids. From June to October, *Chromolaena* puts forth vegetative flushes and higher aphid population in that period is expected on the basis of their preference to fresh flushes. From November onwards, the weed starts flowering and the aphid population progressively decreases during the flowering season, mainly due to lack of food materials of proper quality and due to adverse climatic conditions. *A. spiraeicola* depends on young leaves and shoots for the formation of sizeable populations (Krane *et al.*, 1977). Various predatory insects were found preying on the aphids and these include Chrysopids, Coccinellids and Syrphids. However, there was no positive correlation between the populations of predators and aphids.

Nature of damage of *A. spiraeicola* and *A. fabae*

Nymphs and adults suck sap from tender shoots and leaves causing severe crinkling of the leaves. As a result, the vigour of the plant is very much reduced and in severe cases the plants are stunted, thereby curtailing seed production considerably. Thus a partial failure of the weed in competition with the other weeds was observed.

Intensity of aphid attack in medium hilly areas and plains in different months under different conditions

In the case of intensity of attack, the different villages and different conditions in medium hilly areas and plains did not show any significant variation. But when the intensity in different months was compared, it was significantly higher in July than all other months except in August in both topographic situations and intensity was negligible during the months of November, December, January, February, March, April and May. No significant difference was noticed in the case of intensity of aphid attack between medium hilly areas and plains.

Brachycaudus helichrysi

These pale yellow aphids were noticed in higher elevations of Kerala such as parts of the fdukki and Wynad districts. These were totally absent in plains. The infested plants presented a wilted appearance and the leaves became folded

Table 1

Occurrence of *A. spiraeicola* and *A. fabae* populations on *Chromolaena odorata* in medium hilly areas and plains, population per plant (transformed data)

Month	Medium hilly areas		Score values showing intensity of infestation	Plains		Score values showing intensity of infestation
	<i>A. spiraeicola</i>	<i>A. fabae</i>		<i>A. spiraeicola</i>	<i>A. fabae</i>	
January	2.623	1.125	1.145	1.908	1.000	1.204
February	2.866	1.000	1.101	1.868	1.000	1.181
March	1.125	1.051	1.055	1.000	1.000	1.095
April	1.433	1.051	1.029	1.000	1.000	1.058
May	13.185	2.191	1.560	6.180	1.560	1.195
June	26.863	5/40	1.708	26.590	4.511	1.715
July	36.079	7.799	1.969	26.640	5.103	1.988
August	25.956	4.573	1.832	25.660	5.103	1.827
September	23.004	4.181	1.625	22.460	4.375	1.670
October	16.469	3.663	1.464	18.360	3.406	1.406
November	10.040	1.256	1.153	1.180	1.000	1.178
December	1.571	1.000	1.233	1.490	1.000	1.199
C.D (0.05)	5.045	0.813	0.214	4.130	0.973	0.199

and roiled longitudinally as against the crinkling caused by *A. spiraecola* and *A. fabae*. The whole plants exhibited the symptoms consequent on infestation by *B. helichrysi* whereas in the case of other aphids, damage to leaves is not complete. However, the polyphagous nature of these aphids and low intensity of attack seem to be disadvantageous in bio-control projects.

Summary

In studies on the population fluctuations of the aphid pests of *Chromolaena odorata* Linn. in the plains and medium hilly localities of Trichur district (Kerala State), it was found that *Aphis spiraecola* Patch and *Aphis fabae* Scopoli occurred at peak levels in July in both situations, the diversity of occurrence per unit area being also higher in July. *Brachycaudus helichrysi* Kltb. occurred at higher elevations of the Idukki, Wynad districts causing complete damage to the plants. Nymphs and adults of *A. spiraecola* and *A. fabae* fed on tender leaves and shoots causing severe leaf crinkling. Consequent on feeding by *B. helichrysi* the leaves became rolled and the entire plants showed wilting symptoms. As candidates for the bio-control of *C. odorata* in Kerala, these aphids do not appear to be quite promising.

സംഗ്രഹം

തോട്ടങ്ങളിൽ വ്യാപകമായി കണ്ടുവരുന്ന യൂപ്പറ്റോറിയം (കമ്മ്യൂണിസ്റ്റർ പച്ച) എന്ന കളകൾക്ക് നാശം വരുത്തുന്ന ഏഫിഡുകളെ (മുഞ്ഞ) പറ്റി നടത്തിയ സർവ്വേയിൽ ഏഫിഡ് സൈപറിക്കോളായും ഏഫിഡ് ഫാബേയും സമതലങ്ങളിലും കുന്നിൽ പ്രദേശങ്ങളിലും ജൂൺ, ജൂലായ് മാസങ്ങളിൽ ഏറ്റവും കൂടുതലായി കാണപ്പെട്ടു. ആഗസ്റ്റ്, സെപ്തംബർ, ഒക്ടോബർ എന്നീ മാസങ്ങളിൽ ഇവയുടെ സംഖ്യാ ബലം താരതമ്യേന കുറയുകയും നവംബർ, ഡിസംബർ മാസങ്ങളിൽ ഇവ അപ്രത്യക്ഷമാകുന്നതായും കണ്ടു. ഈ കളയിൽ തന്നെ ബ്രാക്കിക്കോഡസ് ഹെലിക്രസി എന്ന കീടം ഇടുകൂടി, വയനാട് എന്നീ ജില്ലകളിലെ ഉയർന്ന പ്രദേശങ്ങളിൽ മാത്രമാണ് കാണപ്പെട്ടത്. സൈപറിക്കോളാ, ഫാബേ എന്നീ സ്പീഷീസിൽപ്പെട്ട ഏഫിഡുകളുടെ ആക്രമണഫലമായി ചെടിയുടെ തളിരിലകൾ വളർച്ച പ്രാപിയ്ക്കാതെ മുരടിച്ചുപോകുന്നു. ഹെലിക്രസി ബാധിച്ച ചെടികൾ വാടുന്നതായും അവയുടെ ഇലകൾ നീളത്തിൽ ചുരുങ്ങുപോകുന്നതായും കാണുകയുണ്ടായി.

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