Differential Response of Whiteflies (*Bemisia tabaci* Gen;) to Nicotiana Species

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ABSTRACT

Responses of 18 *Nicotiana* species to whiteflies (*Bemisia tabaci*) were studied under glass-house conditions. Fourteen species showed varying degrees of susceptibility, while four were toxic. *N. repanda* and *N. wigandioides* had a minimum number of whiteflies among the susceptible and toxic groups, respectively. *N. glauca* and *N. gossei* were highly attractive to whiteflies within the susceptible and toxic groups, respectively. The paper suggests the utilization of toxic species for extraction of biochemical substance for control of whiteflies and using the species as donors for breeding leaf curl resistant cultivars. Use of *N. gossei* as a plant community benefactor is also suggested. *(Received on Spet. 25, 1975).*

INTRODUCTION

WHITEFLIES, the vectors of leaf curl disease, are important pests of tobacco. This disease adversely affects the product both qualitatively and quantitatively. This pest could be controlled, of course with difficulty, by insecticidal sprays, but the tobacco trade is very averse to chemical residues present in the final product. Hence, biological control either by finding suitable parasites of whiteflies or by developing varieties resistant to whiteflies would be the most desirable way to control the vectors of leaf curl. Many *Nicotiana* species have been found resistant to various insect pests but no information is available about the response of *Nicotiana* species to whitefly infestation. Moreover, the insects prevalent in different regions may vary genetically in regard to insect plant relationships. Hence, the present study was undertaken to find out the response of whiteflies to various *Nicotiana* species under green house conditions.

METHODS

Eighteen *Nicotiana* species (Table 1) were tested in 1974-75. Seedlings, 6 cm tall, of the different species were transplanted in earthen pots of 15 cm dia-

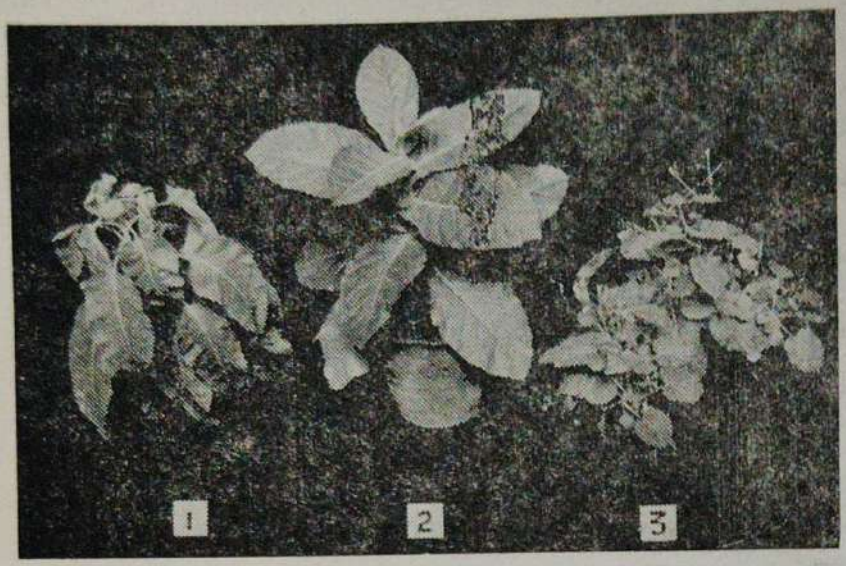

Fig. 1. Susceptible and toxic species of *Nicotiana*

1. *N. glauca* **(Susceptible)**

2. *N. gossei* **(Toxic)**

3. *N. umbratica* **(Toxic)**

meter. One month after transplanting, four pots of each species were randomised on green house benches. Migrant whiteflies from an unknown host provided the source of infestation in the green house. The whiteflies were allowed to breed for 30 days on the different species, and the population was estimated by counting all whiteflies present on the plant, by lifting the leaves gently one by one commencing at the top of the plant and working downwards. It was possible to count the insects while they continued to feed undisturbed. Early morning hours were found to be very congenial for taking counts. Only adults actually sitting and feeding on the leaves were included in the counts. Except in cases of severe infestation a very few adults flew away from the plant during counting.

The different species of *Nicotiana* are divided into two groups viz., susceptible and toxic, the former group had alive whiteflies whereas the latter group had all dead whiteflies. This suggested the desirability to divide the species into two broad categories. The average number of whiteflies on various species are presented in Table 1.

RESULTS AND DISCUSSION

All 18 species (Table 1) gradually accumulated varying degrees of whitefly population. Among the species in the susceptible group, *N. repanda* had the lowest whereas *N. glauca* had the highest number of whiteflies (Fig.1), indicating that the whiteflies preferred to breed profusely on *N. glauca*. Within the toxic group, *N. gossei* and *N. umbratica* were third and fourth in order for the large number of dead flies which indicates the high toxicity levels of these species and rapidity of mortality of the insect. Thurston and Webster (1962) reported the toxicity of *N. gossei* to aphids (*Myzus persicae* Sulz.) due to the toxic principle secreted by the glandular trichomes. It is likely that the same principle may also work against whiteflies when they

TABLE—1

Population of whiteflies on different species of *Nicotiana*.

Nicotiana species	*Average* number of whiteflies*	*Rank*
Susceptible group:		
N. repanda Willd	2	1
N. rustica Lin	9	2
N. langsdorffii Wein	13	3
N. glutinosa Linn	14	4
N. palmeri Gray	25	5
N. hesperis Bur	36	6
N. benthamiana Dom	36	6
N. longiflora Cava	41	7
N. tabacum Lin A. 119	205	8
N. amplexicaulis Bur	277	9
N. debneyi Dom	328	10
N. undulata Rin & Pav	498	11
N. sylvestris Speg & Com	580	12
N. glauca Gr	1500	13
Toxic group:		
N. wigandioides Koch & Fin	4 D	1
N. trigonophylla Don	8 D	2
N. umbratica Bur	210 D	3
N. gossei Dom	344 D	4

*Average of four plants
D–Dead whiteflies

feed on *N. gossei* and *N. umbratica*; the latter species also has trichomes. The cultivated bidi tobacco variety, Anand 119 ranked eighth among the species studied. *N. repanda* and *N. wigandioides* were the least preferred hosts but had different mechanisms to protect themselves from whiteflies; the former had living flies, while the latter had dead flies. These findings indicate the desirability of isolating and identifying the compound responsible for killing the attracted whiteflies. This compound could be utilized in controlling whiteflies. *N. gossei* could also be used for peripheral planting to attract and kill the whiteflies, thus perhaps providing effective protection to the main crop without any insecticidal spray.

Nicotiana glauca would be a desirable host for the mass multiplication of whiteflies for biological studies. During the current study it was observed that though *N. repanda* was a least preferred host, the two whiteflies (on an average) observed on the plant were enough to transmit leaf curl virus as some of the plants had succumbed, whereas none of the species from the toxic group viz., *N. gossei*, *N. umbratica*, *N. trigonophylla*, *N. wigandioides* had leaf curl symptoms. This suggests that presumably the whiteflies feeding on these plants were either killed instantaneously prior to their transmitting the inoculum to the host or that the host cell constituents were not congenial for the multiplication/survival of the virus. Hence the group

of species that inhibit the virus could be utilized for incorporating resistance/tolerance factors to leaf curl in *N. tabacum*. Among the four toxic species, *N. gossei* would be the most desirable donor considering its high toxicity and the rapidity of mortality of whiteflies.

REFERENCES

Thurston, R. and J. A. Webster. 1962. Toxicity of *Nicotiana gossei* Domin to *Myzus persicae* Sulzer. *Entomol. Exp. Appl.* 5: 233-238.