Short Communications

Evaluation of Cowpea lines for Resistance to Aphid *Aphis craccivora* koch+

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Aphid (*A. craccivora* Koch) is an important pest of cowpea (*Vigna sinesis* L) and other grain legumes in most regions in India. It feeds on all the aerial parts of the plant. At seedling stage, the growing point is severely affected resulting in stunting or death of the plant. Infested leaves curl and do not develop fully. Heavy losses occur when inflorescence and pods are affected. Besides being pest, this aphid is an important vector of plant attacking cowpea (Nene, 1972).

In the *kharif* season (July-October) of 1974, an International Cowpea Disease Nursery comprising 104 multiple disease resistant germ plasm lines supplied by the International Institute of Tropical Agriculture, Nigeria, was raised in two replications at the IARI, New Delhi. Widespread aphid attack was observed in this nursery three weeks after planting. The aphid was identified as *A. craccivora*. Since the germplasm lines differed greatly in the extent of infestation, observations were recorded on the number of plants infested, total plants in a germ plasm line and extent of colonization by the aphid in the infested plants 28 days after planting. Only one observation could be taken as insecticide had to be sprayed to save the plants for studying their reactions against diseases.

The observations revealed that six lines viz., TVU-57; —408 P_2 —410; —1037; —3273 and-4538 were uniformly free of aphid infestation in both the replications.

In some germ plasm lines, very few or several plants were affected but aphid population on such plants was not much. Growing shoot was also not deformed compared to twisting and stunting in heavily infested plants in very susceptible lines. The lines in this category were TVU -131; -191; -381; -461; -476 P_2; -1190; -1283; 1404; -1423 P_1; -1446; -2000; -2276; -2545; -3349; -4539 and -4543.

In the remaining 82 germplasm lines large number of plants showed heavy infestation with stunting. Among the released varieties FS-68, C-20, PS-42, NP_1, Barsati Mutant, Pusa Dofasali P_3-1, Pusa Phalguni and Pusa Barsati were moderately to heavily infested. C-152 though showed less infestation in the seedling stage, has been observed in

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the past to be highly susceptible at flowering stage.

Overall field observations indicated that some of the germ plasm lines may be heterogeneous for reaction to aphids. Seedlings in few others grew vigorously inspite of aphid infestation indicating tolerance.

Since single plant progenies in all the promising lines could not be harvested separately, only the six germ plasm lines found uniformly free in the field were taken in the initial artificial testing at Anand, Gujarat. Philippines Bush was used as a susceptible check. Plants were raised in earthen pots (17 cm x 17 cm) in glass house. Four seeds, two of a test line and two of susceptible were sown in each pot 9-10 cm apart. The aphid culture used was collected from wal (*Dolichos lablab*). Twenty apterous adults were placed on primary leaves of each seedling when they were six days old. One plant from each test line and one from Philippines Bush were covered with a glass chimney closed at the top with muslin cloth. Population counts were taken 3, 12 and 18 days after introduction of

TABLE—1

Aphid population on cowpea test lines and Philippines Bush 3, 12 and 18 days after introduction of 20 aphids/plant and effects on seedling height.

Test lines Vs. Philippines Bush	*Av. no. of aphids/plant at*			*Av. height (cm) of plant at*	
	3 days	*12 days*	*18 days*	*22 days*	*28 days*
TVU—57	5.8	2.0	1.2	14.1	19.4
Philippines Bush	35.5	26.8	12.0	9.7	10.0
TVU—408 P_2	13.9	8.6	3.3	13.6	18.4
Philippines Bush	57.0	32.2	+	10.0	+
TVU—410	7.6	2.8	2.6	14.4	19.3
Philippines Bush	32.0	28.6	11.5	9.1	12.5
TVU—1037	6.3	3.0	2.2	14.8	18.0
Philippines Bush	38.3	29.5	14.5	9.6	12.5
TVU—3273	8.7	3.6	2.7	16.1	18.1
Philippines Bush	38.3	37.0	11.4	8.8	10.0
TVU—4538	8.3	2.7	1.7	13.7	16.5
Philippines Bush	41.8	19.8	22.7	8.1	12.5
T—values (calcutated)	3.95*	4.75**	2.42	5.36**	3.12*
Overall mean test lines	8.43	3.78	2.08	14.45	18.26
Philippines Bush	40.48	28.83	14.42	9.22	8.96

+Plants dropped due to heavy infestation of aphids.

the aphids. Height of the seedlings was measured 22 and 28 days after germination. The data obtained were subjected to statistical analysis (paired t-test).

The data presented in Table 1 indicated that all the test lines were highly resistant to aphids. Within 3 days after 20 aphids were placed on each seedling, the aphid population decreased to an average of 8.43 in test lines compared to increase to 40.48 in the susceptible Philippines Bush. In all the test lines

the population continued to decrease as the plant growth advanced and the aphids failed to develop a colony even when they were confined to glass chimney. This suggests that antibiosis is the basis of this resistance.

Most of the aphids in Philippines Bush congregated on the hypocotyl of the seedlings in early stage. As a result of continuous feeding these seedlings lost the vigour and further multiplication of aphids was adversely affected as reflected in counts 28.43 and 14.42 recorded at 12 and 18 days. The drastic reduction in population at 18 days was due to complete drooping of the seedlings.

Observations on the height of plants showed that the test lines had good growth (18.26 cm) compared to Philippines Bush (8.96 cm). No crinckling of leaves was seen in test lines whereas, in Philippines Bush the seedlings remained at two leaves stage and showed the symptoms of crinkling, yellowing and drooping in all the pots (fig. 1).

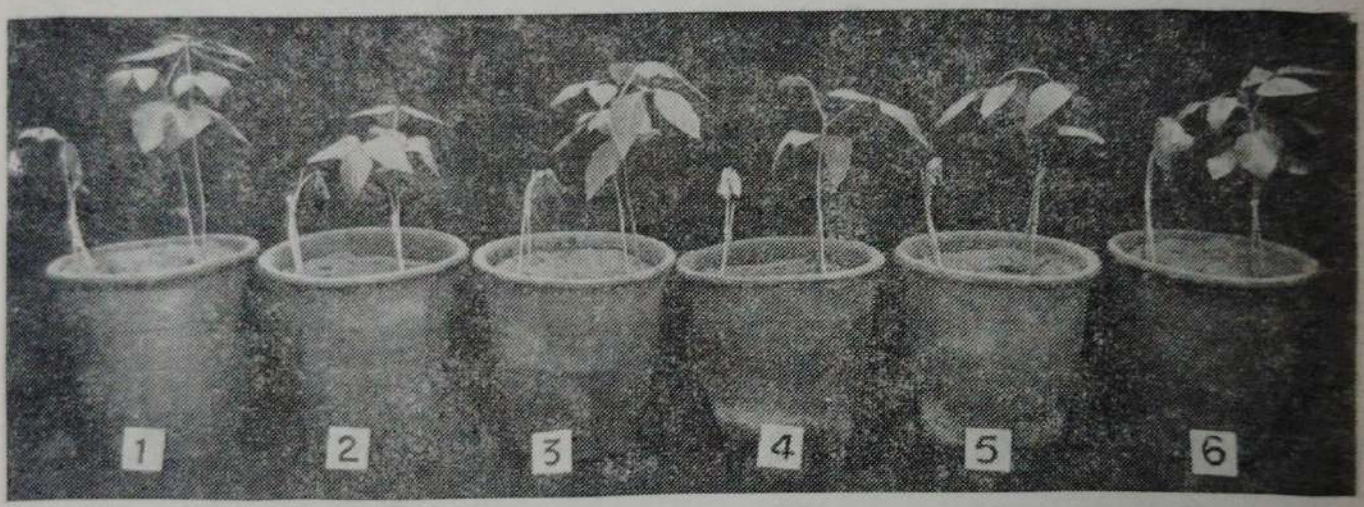

Fig. 1 : Susceptible (left) and resistant (right) lines of Cowpea.

Left : Philippines Bush in 1 to 6 pots.

Right : Pot 1; TVU 57; Pot 2; TVU 408 P_2, Pot 3; TVU 410, Pot 4; 1037; Pot 5; TVU 3273, Pot 6; TVU 4538.

The cowpea lines TVU-57,—408 P_2, —410, —1037, —3273 and—4538 identified as resistant to aphids in this study can be used as donors in developing aphid resistant varieties. In such varieties spread of the aphid transmitted virus diseases will also be very restricted.

REFERENCES

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