PHYSIOLOGY OF BHENDI PLANTS, *ABELMOSCHUS ESCULENTUS* (L.) ASSOCIATED WITH ITS PREFERENCE AND FEEDING BY THE REDSPIDER MITE *TETRANYCHUS CINNABARINUS* BOISDUVAL

PALANISAMY[1] studied several varieties to mite infestation under glass house as well as in field and screened some less preferred types. In this study a detailed account of the nutritive conditions of the plants in relation to the development of the mite as well as on the bio-chemical changes that take place due to its feeding has been reported.

The fecundity rate, total number of larvae hatched out per pair, duration of immature stages, number of days taken by the hatched out larvae to attain adult and longevity of adults were recorded.

Leaf samples collected (8 am) from healthy and mite-infested plants of four varities (Table I) of comparable ages were analysed for moisture, carbohydrates[2], total nitrogen[3], minerals like phosphorus calcium and potassium[4], and resin[5] and free amino acids.

Enhanced fecundity rate, increase in per cent of larvae becoming adults, shortening of developmental time of immature stages and increase in longevity of adults (Table I) on varieties A.E. 75 and Pusa Sawani might be the reason for the high population of mites observed by Planisamy[1] on these varieties. These varieties had less of carbohydrates and more of total nitrogen leading to low carbohydrate/nitrogen (C/N) ratio. That low C/N ratio associated with the preference of mite[6] was also reported earlier. Mites were reported to avoid high concentration of carbohydrate in plants by Henneberry[7]. The mite preference for high nitrogen content was reported in many instances and the present findings is in conformity with that made for *Panonychus ulmi*[8], *Tetranychus telarius*[9-14] and *Aceria scheldoni*[13] (Ewing).

Amino acid content was also high in A.E. 75 and Pusa Sawani. The increase in amino acid content having high chemotactic influence on mites, had already been reported by Sternlicht *et al.*[15]. Out of the six amino acids listed by Mittler[16] that strongly enhance the feeding of aphids, tryptophan was found exceptionally in high amounts and asparagine was found only in these varieties. Further asparagine, aspartic acid and glutamic acid that enhanced the egg production of *Tetranychus telarius*[17] were found in high quantities in preferred varieties. The amino acid tryptophan is the precursor for auxin like IAA. The plant parts having high auxin content were preferred by mites[18] and enable better reproduction and shorter development period[19]. The high moisture, low calcium and resin contents might have facilitated easy penetration of cheliceral styles of mites due to more succulent nature of the leaves. Low potassium content was found to be associated with the preference of mites in the present study which is in confirmation with that made by Henneberry and Smith[20], Mathys[14] and Sternlicht *et al.*[15]. The phosphorus content of the plant was not found to influence the preference of varieties to the mites as had been reported earlier in the case of *Panonychus ulmi*[14].

Mite feeding had resulted in the reduction of carbohydrates and moisture. This might be due to hindrance of photosynthetic activity, as the leaves become 'chlorotic' or removal by mite feeding. Rajagopal *et al.*[6] observed mite infestation reducing the chlorophyll content. The efficiency of photosynthesis in plants is affected when the affinity of chlorophyll for water is interfered with[21]. The reduction in carbohydrate synthesis might have

TABLE I

Preference of red spider mites to bhendi varieties (Means of 5 observations)

	Preferred		Non-preferred		C.D. (t = 0·05)
	A.E. 75	Pusa Sawani	A.E. 1	Long Green	
1. Fecundity/mite ..	27·2	26·2	18·4	16·3	1·84
2. Duration of immature stages (Days) ..	9·4	9·4	13·6	15·8	0·4
3. Larvae becoming adults*	56·8 (59·6)	58·5 (72·5)	41·8 (44·4)	43·8 (48·0)	(9·1)
4. Adult longevity in days					
(i) Male	5·1	6·1	2·9	3·1	..
(ii) Female	8·1	7·5	4·5	4·1	..
(iii) Mean	6·6	6·3	3·7	3·6	0·8

* Per cent of larvae becoming adults (P); in parentheses, the values of arc sin $\sqrt{P}$.

TABLE II

Carbohydrate, nitrogen, moisture, resin, mineral make up and amino acid content of healthy and mite infested leaves of bhendi varieties (Per cent on dry weight basis—Means of three observations)

Sl. No.		Preferred				Non-preferred			
		A.E. 75		Pusa Sawani		A.E. 1		Long Green	
		Healthy	Infested	Healthy	Infested	Healthy	Infested	Healthy	Infested
1.	Carbohydrate ..	8·8	8·6	9·1	9·0	10·8	9·8	10·0	9·3
2.	Total Nitrogen ..	4·8	5·0	4·3	4·6	4·0	4·2	3·6	3·9
3.	Moisture ..	85·3	70·4	87·4	76·5	83·0	74·3	74·7	72·6
4.	Resin ..	18·4	12·6	17·8	13·9	22·2	16·6	22·8	17·9
5.	Phosphorus (P_2O_5) ..	1·04	0·79	0·98	0·90	1·12	0·88	1·06	0·74
6.	Calcium (CaO) ..	2·72	1·42	2·40	0·98	3·04	2·02	3·24	2·24
7.	Potassium (K_2O) ..	3·0	3·4	3·1	3·3	4·2	4·7	4·2	4·4
8.	*Amino Acids* (μg/1·0 g fresh tissue)								
	(i) Asparagine ..	20	60	Trace	Trace	Trace	Trace	Trace	Trace
	(ii) Leucines ..	10	..	10	40	35	30	70	90
	(iii) Alanine ..	330	..	640	120	280	200	Trace	Trace
	(iv) Glycine ..	Trace	40	Trace	Trace	..	Trace	..	Trace
	(v) Aspartic acid ..	500	240	320	70	120	130	140	200
	(vi) Glutamic acid ..	350	420	80	Trace	Trace	Trace	..	..
	(vii) Histidine and Lysine ..	Trace	170	Trace	180	..	Trace	30	10
	(viii) Tryptophan ..	1250	700	460	360	60	80	40	35
	Total ..	2160	1630	1510	770	495	440	280	335

resulted in low resin content which is nothing but a polysaccharide. Utilization of amino acids and phosphorus content by mite might have resulted in their reduction. The peculiar feature was that potassium content was increased due to mite feeding. The reason for this increase is not known. However the increase in potassium would have increased the protein synthesis as reported by Chapman[22]. And this increase in protein synthesis might be the reason for high total nitrogen observed in infested leaves.

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A. REGUPATHY.

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