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BIOCHEMICAL AND PHYSICAL BASES OF RESISTANCE TO BOLLWORMS COMPLEX IN COTTON VARIETIES *

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The two entries of cotton viz., JK 260 and Sharada were studied for biochemical and physical components to identify the bases of resistance. The bolls of JK 260 had high rind thickness compared to the bolls of Sharada, in all ages of observation, Total phenols decreased with an increase in boll age in both entries which varied from 0.98 mg/g to 0.42 mg/g in JK 260 and from 0.80 mg/g to 0.31 mg/g in Sharada, Total sugars and nitrogen content decreased with increasing age in both entries. The crude fibre content was 29.40 and 25.60 per cent in JK 260 and Sharada respectively when the bolls were 40 days old.

Among biotic factors that limit cotton production, incidence of pests is most important. Bollworms not only cause considerable damage but also predispose the bolls for bollrot infections leading to reduction in seed cotton yield, quality of lint and germination of seeds. Investigations were carried out on the influence of boll rind thickness and other contents of boll and their effect on bollworm-bollrot complex in two varieties of cotton.

MATERIALS AND METHODS

Two entries of cotton (*Gossypium hirsutum*), one with moderate level of resistance (JK 260) and the other susceptible (Sharada) were chosen based on Ilango (1987). Bolls of four age groups *viz.*, 10, 20, 30 and 40 days were selected for estimation of rind thickness, crude fibre, total phenol, total sugar, total nitrogen and gossypol. Uniformity in sampling was maintained and care was taken to fix the age of bolls by tagging the bolls.

Rind thickness was estimated with a screw gauge. Rind was separated immediately after removing the bolls from the plants, thickness measured at the tip, middle and base of bolls and ten bolls in each of the two entries in four ages were used for this purpose. Crude fibre was estimated as per A.O.A.C. (1960) and total phenol by adopting the method of Bray and Thorpe (1954). Estimation of total sugar and total nitrogen as per Nelson (1944) and Jackson (1958) respectively while the method described by Bell (1967) was adopted to estimate the gossypol content.

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Table 1 Boll contents of moderately resistant and susceptible cotton entries

Age of bolls (days)	Rind thickness (mm)		Crude fibre (%)		Total Nitrogen (%)		Total sugars (mg/g)		Total phenol (mg/g)		Gossypol (%)	
	JK 260 (R)	Sharada (S)	JK 260 (R)	Sharada (S)	JK 260 (R)	Sharada (S)	JK 260 (R)	Sharada (S)	JK 260 (R)	Sharada (S)	JK 260 (R)	Sharada (S)
10	0.81	0 61	11.10	10.40	0.29	0.32	39 79	42.93	0.98	0.80	0.78	0.69
20	1.48	1.34	13.80	12 80	0.26	0 28	31 21	33.57	0.61	0.55	0.52	0.41
30	1.74	1 57	18.60	16 70	0.25	0.26	13.78	14.70	0.57	0.49	0.38	0.33
40	1.83	1.76	29.40	25.60	0.20	0.22	9.37	11.73	0.42	0.31	0.29	0.24

R = Resistent; S = Suscepiible

RESULTS AND DISCUSSION

The data on rind thickness and boll contents are presented in Table 1. Higher boll rind thickness was observed in JK 260 than in Sharada irrespective of age of the bolls. Thickness of rind is negatively corre'ated with the incidence of bollworms. Kittock *et al.* (1973) reported lesser damage by pink bollworm with increase in boll rind thickness due to spraying of growth regulators. Singh and Singh (1969) and Singh and Singh (1970) also reported increased boll rind thickness due to spraying of growth regulators which offered resistance to *Earias fabia* [Boisduval]. Crude fibre is believed to impart physical resistance to young bollworm larvae by offering resistance for entry into the boll. The increased crude fibre content in JK 260 observed in the present study may be responsible for the resistance exhibited by this entry.

Phenolic compounds are known to impart resistance in many crop plants against pests and diseases. Higner phenol content was observed in JK 260 and this might have contributed for resistance in this variety. Increase in phenolics was reported to be responsible for disease resistance in cotton seedlings (Ramasami and Shanmugham, 1977). Total sugar and nitrogen content decreased with increasing age in both entries. Higher sugar content is known to be favourable for pathogens causing diseases. Cauquil (1973) reported the internal resistance to bollrot disease due to low sugar content. In the present study the lesser amount of total sugar present in JK 260 might have imparted resistance to this entry as compared to Sharada.

Gossypol is known to be deleterious at higher concentration in cotton plants. Bell (1967) reported that an increase in bollrot with an increase in boll age due to decrease in gossypol content. In the present study, the gossypol content decreased from 0.78 to 0.29 and 0.69 to 0.24% in JK 260 and Sharada respectively. Abdel Rahim *et al.* (1980) and Duhoon *et al.* (1981) also reported the deleterious effects of gossypol on bollworms. In the present study, higher quantity of gossypol was noticed in JK 260 and this along with other contents of boll like crude fibre and total phenols might have contributed for the resistance observed in this entry.

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