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INFLUENCE OF SOIL AND VARIETAL FACTORS ON DRY MATTER, QUALITY AND QUANTITY OF COTTON

V. K. KHADDAR, S. B. JADHAV and N. RAY
Project for the Management of Salt Affected Soils, J. N. Agricultural University, Indore Campus 452001, India.

COTTON plants belong to the group of tolerant crops, to sodicity[1] and its range of exchangeable sodium percentage (ESP) tolerance is 40–60. This tolerance is related with the growth and economic yield of this crop and gives no indication regarding the change (if any) in fibre properties. The present study was undertaken to study this aspect along with the yield of dry matter and seed cotton under naturally occurring heavy as well as predominently sodic and normal vertisol soils.

The experiment was conducted in pot culture in the pot house of the College of Agriculture, Indore, with 20 kg soil and two varieties of cotton (*viz.*, Khandwa-2 and Barwaha selection), replicated twelve times. Throughout the growing period, the moisture condition was maintained at field capacity and two plants were maintained per pot. After the last picking, the wt of seed cotton as well as dry wt/plant were recorded at the Cotton Technological Research Laboratory at Indore and are presented in table 2. Soil analysis before the start of the experiment has been done in respect of pH, C. E. C., E. Ce, E. S. P. and the available N, P, K as well as organic matter are presented in table 1.

The data on soil characteristics show that the cation exchange capacity of normal black cotton soil of Indore is greater than that of the salt-affected soil of Barwaha Experimental Station. The pH, E. Ce and E. S. P. of the latter soil especially the E. S. P. were much greater than in the normal soil. In fertility status also, normal black cotton soil had higher values (of available N, P, K and organic matter). In dry matter, contents and yields of seed cotton plants grown under normal soil were superior to those of the plants grown under predominantly sodic soil as reported earlier[2].

The reduction in the yield of seed cotton was however smaller in comparison with the reduction in dry matter/plant under sodic soil, which indicated that the yield of seed cotton can adjust itself better than the growth of the plants under adverse conditions. Bernstein[3] also indicated that the yield of seed or fibre in cotton might not decline even when salinity caused a decrease (as much as 50%) in plant size. It had been due to effective competition for photosynthates between the vegetative and reproductive parts. Photosynthates would preferentially flow to those sinks that had been most active at that time[4].

Fibre characteristics, like mean fibre length, fineness, maturity per cent as well as 'fibre quality index' showed no significant difference due to different soils. But bundle strength was significantly greater in sodic soil than in normal black cotton soil. Eaton[5] pointed out the genetic constitution to be the single most important consideration in determining the quality of cotton fibre, though certain other factors like water supply, locality, season, application of farm yard manure or even a particular dose of nitrogen, were also found to affect the fibre quality[6]. Recently Jadhav *et al*[7] found that fibre length also had significantly increased in sodic soil with lower dose of gypsum application (25% of gypsum requirement) than with a moderately higher dose (50% of gypsum requirement).

As far as the varietal differences were concerned, Barwaha Selection was found to have significantly higher dry wt of plants, higher yield of seed cotton, coarser fibre, higher bundle strength and better fibre quality index (Q) * (as derived by Lord[8]), in comparison to that of Khandwa-2.

The interaction effect (between soils and varieties) was significant only on maturity %. Barwaha Selection in normal soil had higher maturity % in comparison with that of Khandwa-2 and Barwaha Selection in sodic soil.

Indian *hirsutum* cotton, is poor in maturity and strength[9]. In the present study, however, both the cotton varieties, though belonged to *hirsutum* species, were better in bundle strength. In sodic soil bundle strength of Barwaha Selection belonged to 'very good' category according to the classification of Oka *et al*[10]. In Khandwa-2 also, the bundle strength in sodic soil reached 'good' category from the 'average' in normal

$Q = (S_{1/8}\, L/HS)m$ where $S_{1/8}$ is the bundle strength at 1/8" gauge g/tex, L is the mean fibre length (mm), and HS is the intrinsic fineness which is standard fibre weight (g/inch) and m is maturity co-efficient.

Table 1 *Characteristics of normal (black cotton) and Barwaha (predominantly sodic) soil.*

Soil characteristics	Normal (black-cotton) soil	Predominently sodic soil of Barwaha
pH	7.8	8.9
C. E. C.	51.2	44.7
E. S. P.	5 6	41.3
E. Ce m. mhos/cm	0.72	4.6
Available nitrogen	170 kg/ha	120 kg/ha
Available phosphorus (P_2O_5)	20 kg/ha	15 kg/ha
Available potash (K_2O)	500 kg/ha	250 kg/ha
Organic matter	0.51 %	0.40%

soil. Hence it may be said that during the last 20 years, some Indian varieties of *hirsutum* cotton having higher tensile strength have come up. Eaton[11] had indicated that close spacing (6 inches or less) resulted in reduction in fibre strength to the extent of 2.6% and cautioned that this reduction in strength should not be taken lightly. He also observed that with an increase in fibre strength there was reduction in the fibre length (as in the case of water deficiency). In the present study the strength of fibres increased to the extent of 6% when grown in predominantly alkali soil but without any reduction or deterioration in other quality characters; hence it seemed to be of considerable importance to the cotton industry.

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Table 2 *Quality characteristics of two cotton varieties under normal and sodic soil conditions*

Characteristics	Varieties	SOILS Normal	Sodic	Variety means	
Dry matter/plant (g) during harvest	BS	66.93	43.75	55.35	
(-yield of seed/ cotton)	K	58.98	31.93	45.45	C. D. at 5% for soils and varieties = 0.94
		62.96	37.84 (−39.9%)		
Yield of seed/ cotton (g/plant)	BS	42.78	35.91	39.35	
	K	32.03	26.75	29.39	C. D. at 5% for soils and varieties = 1.75
		(37. 4)	(31.33 (−16.2%)		
Mean fibre length (mm)	BS	26.07	26.56	26.32	
	K	26.53	26.08	26.30	
		(26.30)	(26.32)		
Mean fibre fineness	BS	3.83	3.90	3.86	C. D. at 5% for varieties = 0 18
(micronaire 10^{-6} g/inch)	K	4 00	4.13	4 06	
		(3.91)	(4.01)		
Mean bundle strength	BS	45.02	47.81 (+6.20%**)	46.41	C. D. at 5% for varieties 1.01
('O' gauge) g/tex	K	41.64	44.32(+6.43%	42.98	C. D. at 5% for soils 1.01
		43.33	46.06 (+6.32)		
Fibre maturity %	BS	81.91	76.66	79.29	
(NaOH method)	K	75.16	78 41	76.79	C. D. at 5% for interaction between variety and soil + 4 54
		(78.54)	(77.54)		
Fibre quality	B	143.92	137.05	140 48	
index	K	125 56	122.60	124 08	C. D. at 5% for varieties
		134.74	(129 82)		

BS: Barwaha Selection; K: Khandwa-2; Figures in brackets denote % of increase or decrease over normal soil means

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EFFECTS OF THREE BENZYLOXY COMPOUNDS ON THE WEIGHT OF DIFFERENT DEVELOPMENTAL STAGES FOLLOWING LARVAL TREATMENT IN *CORCYRA CEPHALONICA* (STAINTON) (LEPIDOPTERA: PYRALIDAE)

N. ROYCHOUDHURY and S. CHAKRAVORTY

Department of Zoology, University of Kalyani, Kalyani 741 235, India

AFTER the discovery of some aromatic schiff bases and related compounds as insect juvenile hormone mimics, their merits were assessed by biological tests on *Oncopeltus fasciatus* and *Tenebrio molitor*[1]. A further exploration of three benzyloxy compounds AI3-63604, AI3-63629 and AI3-63701 on the growth and development of insects was therefore undertaken[2]. The present paper deals with changes in the body weight of different developmental stages after treatment on the last instar larvae of the rice moth, *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae), a major pest of stored commodities[3,4].

The three benzyloxy compounds (figure 1) were applied topically in acetone solution on active feeding stage of 0–24 hr old last larval instar at the rates of 100, 50, 10 and 1 μg per individual. Each individual received 1 μl solution containing the required amount of the compounds and 1 μl of pure acetone per individual served as control treatments. Both treated and control

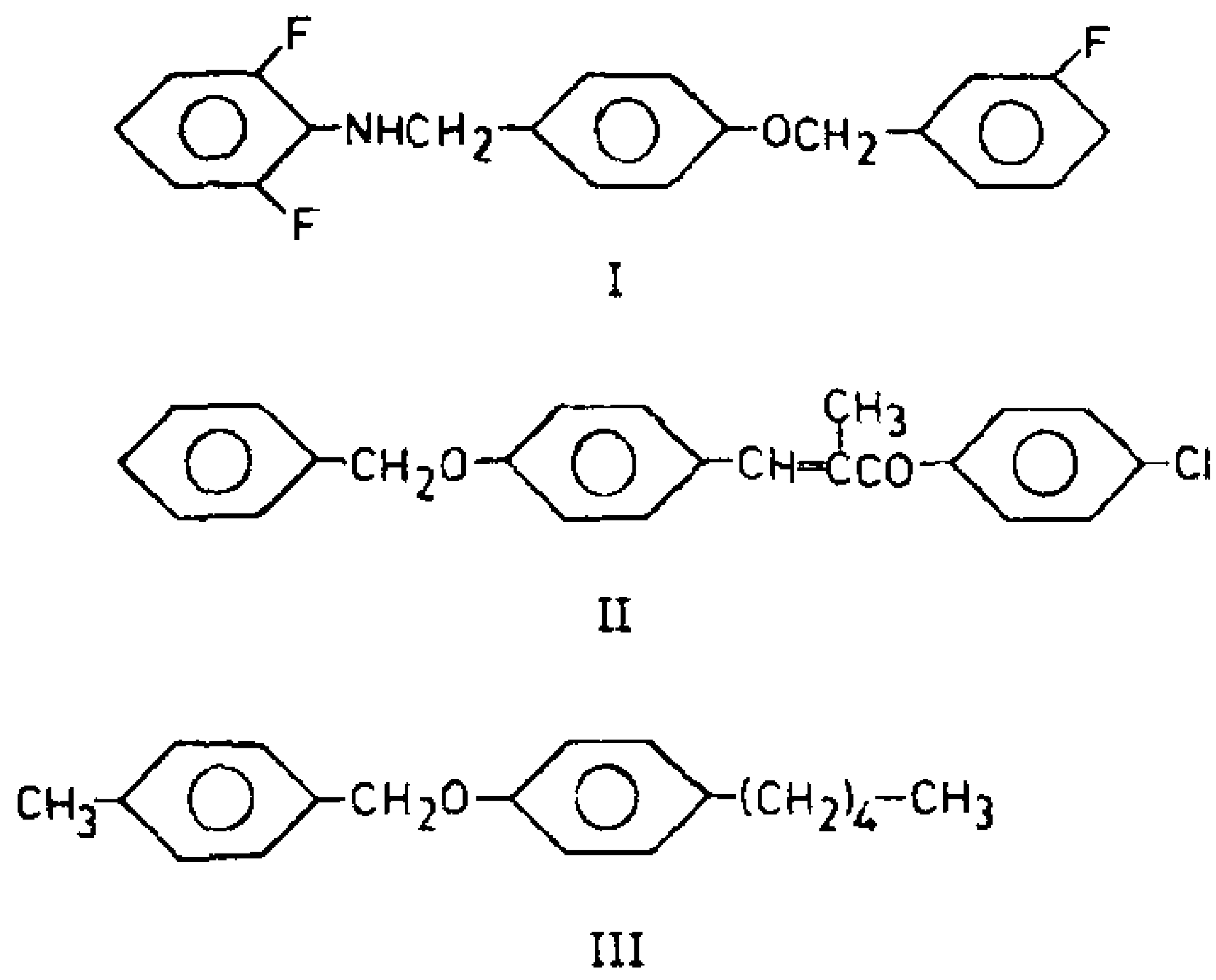

Figure 1. Chemical structure of the three benzyloxy compounds: I AI3-63604, II AI3-63629, III AI3-63701

individuals were reared at 29 ± 1°C, 80–90% relative humidity and 14–10 hr light (semi-dark) dark cycle with powdered grains of sorghum [*Sorghum bicolor* (Linn.) Moench] as food. After treatment the larvae were released in jars containing food. All the control and most of the treated larvae passed through post-feeding state[5], and then pupal stage before attaining the adult stage. Sufficient number of such developmental stages, in the same age groups (0–24 hr), were collected and weighed randomly from all the treatments and controls. The nature of significance in the differences of mean values of the weight of different developmental stages in treated and control series was tested by analysis of variance technique.

The three benzyloxy compounds prolonged the larval life span 1–2, 1–3 and 5–8 times respectively. Of course, active feeding lasted for about half of the total larval life period. Moreover, the experimental larvae underwent 1, 1–3 and 2–4 extra moults after the application of three compounds respectively[6,7]. The giant supernumerary larvae, finally formed after increased food consumption, were bigger and heavier at the post-feeding state (table 1).

In AI3-63604 treatment, the larvae at post-feeding state differed in weight significantly from control ($F = 34.600$, $P < 0.001$; d.f. 4,45) and the dosage effects were non-significant ($P > 0.05$) in 50 μg and 10 μg treatments; 100 μg treatment, however, produced significantly different effects ($P < 0.01$). The weights in AI3-63629 and AI3-63701 treatments differed significantly from control values ($F = 231.349$, $P < 0.001$; d.f. 4,45 for AI3-63629 treatment and $F = 220.321$,