

## EFFECT OF TRIAZOLES ON GROWTH AND YIELD ATTRIBUTES OF *SESAMUM INDICUM* LINN.

K.K. BORA

Department of Plant Physiology, Rajasthan College of Agriculture,  
Udaipur - 313001, India

### ABSTRACT

Paclobutrazol and XE-1019 reduced plant height, number of nodes, number of leaves, leaf area, dry weight of shoot, relative growth rate and net assimilation ratio but enhanced leaf area ratio in sesame. Treated plants had higher number of pods but low 1000-seed weight and significantly reduced yield due to poor seed setting.

### INTRODUCTION

*Sesamum indicum* is the oldest oilseed crop known to man, but not much efforts have been made to improve its yield (2-3 q/ha). Jain et al. (1985) identified high rate of bud, flower and pod abscission as the cause of low yields in sesame. Abscission of these organs can be prevented with the help of various synthetic growth regulators such as benzathiadiazole, morphactin and ethephon (Bora, 1981).

The newer derivatives paclobutrazol (2RS, 3RS)-1, 4-chlorophenyl-4, 4-dimethyl-2-(1,2,4-triazole-yl)-pentan-3-ol) and XE-1019 (E)-1 (4-chlorophenyl-4, 4-dimethyl-2-(1,2,4-triazole-1) yl-penten-3-ol) have shown strong growth controlling properties in a range of species (Davis et al., 1986; Bora, 1988; Bora and Sharma, 1988). This study reports their effects on the growth and yield of sesame.

### MATERIAL AND METHODS

Plants of *Sesamum indicum* cv TC-25 were grown in 30-cm earthen pots (two plants per pot) containing 5 kg calcareous soil of Udaipur. At flower initiation stage (35 DAS), the soil in each pot was treated with 100 ml of 0.3 ppm and 1 ppm of paclobutrazol and (i.e. 30  $\mu$ g and 100  $\mu$ g/pot). The untreated plants served as control. Observations on plant height, number of nodes and leaves, and shoot dry weight were recorded 20 days after the treatments. Leaf area was measured with the help of automatic leaf area meter (LiCOR) and parameters viz., relative growth rate (RGR), net assimilation rate (NAR) and leaf area ratio (LAR) were computed as described by Bora (1981). At the harvest, the dry matter and seed yield were recorded and the harvest index was calculated from them. Every observation had three replicates of six plants each. The experiment was repeated twice for yield observations.

## RESULTS AND DISCUSSION

Paclobutrazol drastically reduced plant height, number of nodes, number of leaves and total shoot weight (Table 1). The effects of XE-1019 were similar but less pronounced. Paclobutrazol (100  $\mu\text{g}/\text{pot}$ ) was found to be the most effective (Table 1). The responses were consistent with earlier reports (Davis et al., 1985, Davis et al., 1986; Bora and Sharma, 1988).

Both paclobutrazol and XE-1019 reduced the RGR and NAR but enhanced LAR (Table 2). The effects of XE-1019 were again of a lower order than paclobutrazol. These changes were followed by reduced shoot dry weight and seed yield (Table 3).

Table 1. Effect of paclobutrazol (Paclo) and XE-1019 on growth of sesame after 20 days of spray (55 d.a.s.)

Treatments	Plant height (cm)	No. of nodes	No of leaves	Leaf area ( $\text{cm}^2$ )	Shoot dry weight (g/plant)
Control	48	15.5	16.0	227.95	2.33
Paclo 30 $\mu\text{g}/\text{pot}$	39	12.5	15.5	215.72	1.55
Paclo 100 $\mu\text{g}/\text{pot}$	35	12.0	15.0	196.26	1.40
XE-1019 30 $\mu\text{g}/\text{pot}$	46	14.0	17.0	179.83	1.75
XE-1019 100 $\mu\text{g}/\text{pot}$	40	12.5	12.5	154.77	1.37

Table 2. Effect of paclobutrazol (Paclo) and XE-1019 on relative growth rate (RGR), net assimilation rate (NAR) and leaf area ratio (LAR) of sesame after 20 days of spray (55 d.a.s.)

Treatments	RGR (g/day)	NAR ( $\text{mg}/\text{cm}^2/\text{day}$ )	LAR ( $\text{cm}^2/\text{g}$ )
Control	0.120	0.957	125
Paclo 30 $\mu\text{g}/\text{pot}$	0.094	0.583	161
Paclo 100 $\mu\text{g}/\text{pot}$	0.088	0.516	171
XE-1019 30 $\mu\text{g}/\text{pot}$	0.103	0.757	137
XE-1019 100 $\mu\text{g}/\text{pot}$	0.087	0.599	145

Table 3. Effect of paclobutrazol (Paclo) and XE 1019 on yield attributes and harvest index (HI) of sesame

Treatment	No. of pods/ plant	1000-seed weight (g)	Seed yield (g/plant)	Final shoot dry wt (g/plant)	HI (%)
Control	10.5	3.371	2.62	7.35	35.60
Paclo 30 $\mu\text{g}/\text{pot}$	13.0	3.017	1.93	4.98	38.76
Paclo 100 $\mu\text{g}/\text{pot}$	13.5	3.163	1.80	5.18	34.68
XE-1019 30 $\mu\text{g}/\text{pot}$	16.5	3.233	2.09	5.85	35.72
XE-1019 100 $\mu\text{g}/\text{pot}$	16.0	3.325	1.75	5.65	30.97
CD at 5%	ns	ns	0.56	1.10	ns
CD at 1%	ns	ns	0.80	1.56	ns

Both these derivatives of triazoles, though increased the number of pods, but reduced test weight and finally also reduced the seed yield. These chemicals, thus, appeared to have prevented abscission of flowers and/or pods, but there was no favourable effect on seed per pod. Harvest indices indicated that these chemicals were unable to alter source-sink relationship and thus reduced the seed yield (Table 3). Hampton and Hebblethwaite (1985), however, reported that paclobutrazol increased the seed yield of *Lolium perenne* by favourably affecting HI. The results suggest the need of further studies with regard to proper concentration, application timing and number of applications to modulate plant productivity favourably.

#### ACKNOWLEDGEMENTS

The authors thank Dr. Tim D. Davis, BYU, Provo, USA for the supply of paclobutrazol and XE-1019. The technical help rendered by Shri S.L. Jain is thankfully acknowledged.

#### REFERENCES

- Bora, K.K. 1981. Studies on role of bio-regulants and pollutants in growth and productivity of desert plants. Ph.D. thesis, Botany Department, University of Jodhpur, Jodhpur, India.
- Bora, K.K. 1988. Prevention of iron chlorosis in plants by growth substances. The 13th International Conference of Plant growth substances (Abstract). July 17-22, 1988. University of Calagary, Calagary, Canada.
- Bora, K.K. and Sharma, D.D. 1988. Effect of triazole, morphactin and sequestrene-Fe on development of iron chlorosis, iron enzyme and dry matter yield in *Arachis hypogaea*. International Congress of Plant Physiology, New Delhi (Abstract). 209-210.
- Davis, T.D., Emimo, K., Shurtleff, W. and Sankhla, N. 1985. The promise of paclobutrazol. Interior Landscape Industry. 2(11): 36-41.
- Davis, T.D., Sankhla, N. and Upadhyaya, A. 1986. Paclobutrazol: A promising plant growth regulator. In Purohit, S.S. (ed) Hormonal Regulation of Plant Growth and Development, Vol. III : 311-331. Agro Botanical Publishers, Bikaner, India.
- Hampton, J.G. and Hebblethwaite, P.D. 1985. The effect of the growth regulator paclobutrazol on the growth, development, and yield of *Lolium perenne* grown for seed. Grass Forage Science. 40: 93-101.
- Jain, G.L., Singhi, S.M., Sahu, M.P. and Sharma, G.L. 1985. Sesame production in Rajasthan- constraints and opportunities. In Srivastava, H.C., Bhaskaran, S. and Menon, K.K.G. (Ed.) Oilseed production constraints and opportunities. Oxford and IBH Publishing Company, New Delhi, 181-197.