

# Comparative Resistance and Susceptibility in Different Genotypes of Normal and Stub Cotton Against Bollworms

MUHAMMAD REHMAN, M. JALAL ARIF, M. AFZAL MURTAZA†, M. HAMED† AND M. ZAHID†

*Department of Agriculture Entomology, University of Agriculture, Faisalabad-38040, Pakistan*

*†Nuclear Institute of Agriculture and Biology, Faisalabad-Pakistan*

## ABSTRACT

The comparative resistance/susceptibility of five cotton genotypes of normal and stub cotton to bollworms was studied under field conditions. The results revealed that infestation of spotted bollworm was significantly high on squares and green bolls of NIAB-78. The infestation of American bollworm of cotton was high on VH-53 followed by NIAB-krishma and FH-900. The infestation on green boll of CIM-446 caused by pink bollworm was significantly high followed NIAB-78. However, overall infestation of bollworm complex was found to be high on CIM-446 as compared with other varieties in normal and stub conditions. It can be inferred from the results that CIM-446 was more susceptible to bollworm complex, however NIAB-krishma emerged as comparatively resistant/ tolerant variety to bollworms.

**Key Words:** Cotton genotypes; Bollworms; Resistance; Susceptibility

## INTRODUCTION

Cotton (white gold) is a major cash crop of Pakistan. This crop provides livelihood to millions of people engaged in its trade and textile industry. Moreover, it is a major source of foreign exchange earning which not only provides raw material for our local industry but also stands at the top of exports and has 63.2% share in total exports in the last fiscal year 1998-99 (Anonymous, 1999). Therefore, there is a dire need to produce maximum and best quality cotton in Pakistan. Cotton bollworms damage the cotton crop very severely. The intensity of their attack is, sometimes so severe that it results in total destruction of the crop. According to an estimate, they reduce the annual potential of agriculture production by 25% (Anonymous, 1999). One of the safe measures to evade such a situation, is to grow resistant cotton cultivars. Finding out of comparative resistance in normal and stub cotton, which is generally practised in Punjab and Sindh provinces, respectively is a pre-requisite for the success of such a strategy. Very few information on the comparative resistance of normal and stub cotton except that of foreign workers, i.e., Gillespie *et al.* (1978), Bergman *et al.* (1980), Flint *et al.* (1980), Bergman *et al.* (1983), Joglan, (1986) and Niles and Greef (1989) is available. Therefore, present study is very imperative under the local agro-climatic condition.

## MATERIALS AND METHODS

The studies were conducted at Nuclear Institute for Agriculture and Biology (NAIB) Faisalabad. There were five cotton cultivars, normal sown and stub namely, (V1) NAIB-78, (V2) NIAB-krishma, (V3) FH-900, (V4) VH-53 and (V5) CIM-446. The experiment was laid out in RCBD with five treatments having four repeats each. The data of the bollworm population were taken from flower buds and

bolls on weekly basis from the normal and stub cotton from July to October. There were four rows of cotton in each treatment. In each treatment, eight plants were selected, i.e., 2 plants/row at random for recording pest population. These plants were tagged and were not considered again, when next observations were taken. The mean population of different bollworms, i.e., American bollworm, spotted bollworm and pink bollworm were calculated on percentage infestation basis.

## RESULTS AND DISCUSSION

Data presented in Table I indicated that maximum square infestation of 5.844% was observed in V1 while the minimum 5.306% in variety V5. However, there was no significant difference among the varieties in V2, V3, V4 and V5, respectively in normal and stub cotton. The maximum infestation (5.404%) was observed on bolls in V3 while the minimum (4.870%) was recorded on the variety V5. However, infestation was non-significant among the varieties in V2, V1, V4 and V5, respectively in normal and stub conditions. These findings on per cent infestation of spotted bollworm on squares and green bolls conform to those already completed by Bughio *et al.* (1984), Wahla *et al.* (1998) and differ with that of Joglan (1986) possibly due to climatic and varietal differences. Data in Table II revealed that the maximum infestation (2.356%) was recorded on squares in V4 while the minimum (1.569%) was recorded on the variety V1, however, there was non-significant difference among the varieties in V2, V5, V3 and V1, respectively in normal and stub cotton. The maximum infestation was recorded on bolls in V4 (2.264%) and the minimum (1.496%) was recorded on the variety V1. However, there was non-significant difference among the varieties in V3, V2, V5 and V1 in normal and stub cotton. These findings on per cent infestation of American

bollworm on squares and green bolls are in close conformity with those of Gillespie *et al.* (1978), Bergman *et al.* (1980) and Rao and Prasad (1996).

**Table I. Per cent mean infestation of spotted bollworms on squares and green bolls in different genotypes of normal and stub cotton**

Variety	Squares	Green bolls
	Mean	Mean
(V1) NIAB-78	5.844	5.307
(V2) NIAB-Krishma	5.394	5.378
(V3) FH-900	5.452	5.404
(V4) VH-53	5.378	4.880
(V5) CIM-446	5.306	4.870

**Table II. Per cent mean infestation of American bollworm on squares and green bolls in different genotypes of normal and stub cotton**

Variety	Squares	Green bolls
	Mean	Mean
(V1) NIAB-78	1.569	1.496
(V2) NIAB-Krishma	2.202	1.798
(V3) FH-900	1.811	2.221
(V4) VH-53	2.356	2.264
(V5) CIM-446	1.858	1.496

Maximum infestation (5.711%) was recorded on green bolls in V5, while minimum on V2. However, there was non-significant difference among the varieties in V1, V3, V4 and V2 in normal and stub cotton. The comparison in mean values of seed damage caused by pink bollworm in cotton genotypes indicated that maximum infestation (16.58%) was recorded in V2 and minimum (12.48%) in V3. However, the damage varied significantly in the varieties in normal and stub cotton. These findings on per cent infestation of pink bollworm on green boll and seed damage are compatible with those of Gillespie *et al.* (1978), Bergman *et al.* (1980), Bughio *et al.* (1984), Ahmad *et al.* (1987) and Wahla *et al.* (1998).

**Table III. Per cent mean infestation of pink bollworm on green bolls and seed in different genotypes of normal and stub cotton**

Variety	Green bolls	Seed damage
	Mean	Mean
(V1) NIAB-78	5.547	13.831
(V2) NIAB-Krishma	4.963	16.503
(V3) FH-900	5.456	12.478
(V4) VH-53	4.993	15.421
(V5) CIM-446	5.711	14.669

## REFERENCES

- Ahmad, M., M.R. Khan and M. Saeed, 1987. Studies on factors contributing resistance in five new cultivars of cotton against insect pests. *Pakistan Entomol.*, 9: 75–83.
- Anonymous, 1999. *Agricultural Statistics of Pakistan, 1998-99*. Government of Pakistan, Ministry of Food and Agriculture, Livestock Division (Economic Advisor Wing), Islamabad.
- Anonymous, 1999. *Economic Survey*. Government of Pakistan, Fin. Div. Adv. Wing, Islamabad, pp. 89–90.
- Bergman, D., T.J. Henneberry, L.A. Bariola and T. Watson, 1980. Cotton insect populations in Arizona stub cotton systems. *Proc. Beltwide Cotton Prod. Res. Conf.*, pp. 271–6.
- Bergman, D., T.J. Henneberry, L.A. Bariola and J.M. Gillespie, 1983. Studies of pest and beneficial insects in Arizona stub and planted cotton. *Agric. Res. Results, Sci. and Education Admin*, W-32, VI+25PP USA [*Rev. Appl. Entomol.*, (A), 72 (8): 626-627; 1984].
- Bughio, A.R., A. Rahman, A.Q. Zafar, T. Hussain and Q.H. Siddiqui, 1984. Field evaluation of cotton instants for pink and spotted bollworms resistance. *Nucleus Pakistan*, 21: 47–9 [*Rev. Appl. Entomol.*, (A), 74 (3): 116; 1986].
- Flint, H M, S.S. Salter and S. Walters, 1980. Development of cotton and associated beneficial and pest insect populations in a ratoon field at phoenix, Arizona. *Agric. Reviews and Manuals*, Science and Education Admin. ARM-W-15, IV+14PP. USA [*Rev. Appl. Entomol.*, (A) 69: 583; 1981].
- Gillespie, J.M., T.F. Watson, T.J. Henneberry and L.A. Bariola, 1978. A comparison of 1978 insect populations on stub and planted cotton in central Arizona. *Proc., Beltwide Cotton Prod. Res. Conf.*, pp. 99–103.
- Joglan, R.S., 1986. Population build up of bollworms on ratoon cotton. *Indian J. Pl. Prot.*, 13: 109–10.
- Niles, G.A. and M.S. Greef, 1989. Ratoon cotton in perspective. *Trechn. Comm., Deptt. Agric. Water supply, South Africa*, 217: 12.
- Rao, C.N. and V.D. Prasad, 1996. Comparative population growth rates of *Helicoverpa armigera* (Hub.) on certain cultivars of cotton, *Gossypium hirsutum* L. *Ann. Pl. Prot. Sci., India*, 4: 138–41.
- Wahla, M.A., M. Tufail, M. Afzal and M.N. Tariq, 1998. The comparative resistance of some recent releases of cotton cultivars to the insect pest complex. *Pakistan Entomol.*, 20: 92–4.

(Received 03 December 2000; Accepted 30 December 2000)