

Influence of sowing time and moisture regimes on cry protein concentration and related parameters of Bt-cotton *

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Abstract: Field experiment was conducted to study the influence of sowing time and moisture regimes on cry protein concentration at Agriculture Research Station, Dharwad for two years (2005-06 and 2006-07) under irrigated conditions. Early sowing of Bt-cotton (June) shown significantly higher cry protein expression than late sowings (July and August). Bollworm incidence increased with delayed sowing. Increased incidence of bollworm to late sowing may be attributed to decreased level of cry protein concentration. Higher SPAD readings and leaf N concentration were observed in early sown crop at 60, 120 and 150 DAS. Early sown crop might have better nitrogen uptake as indicated by higher leaf N concentration, which has probably altered the cry protein level by improving protein synthesis and metabolism in Bt-cotton. Cry protein expression in Bt-cotton from 90 to 150 days after sowing (DAS) as influenced by different moisture regimes indicated that 0.8 IW/CPE recorded significantly higher cry protein concentration as compared to other regimes. Effect of moisture regimes on pest incidence was little and not significant at early stages (60 and 90 DAS). However, pest incidence was significantly affected with moisture regimes at 120 DAS, owing to the decreased level of cry protein and increased effect of soil moisture.

Key words : cry protein, spad readings, nitrogen uptake, moisture regimes, sowing time

Introduction

Low yields of cotton in the country are mainly due to damage by bollworms. Damage was estimated to be 20 to 80 percent. Besides, several other factors like low productive genotypes, low adoption of recent production technologies, late sowings, low soil fertility management practices and improper scheduling as well as application of water are also causes for low yields to some extent. Since the release of Bt-cotton in our country in 2002 meager efforts were made to decide the optimum production technologies due to thinking that production technologies developed for existing non-Bt would be ideal for Bt-cottons. However this may not be true. There is a need to develop the agronomic management schedule. Suitable planting time is the most important for any crop (Pawar *et al.*, 1976). Change of plant type in Bt-cotton, its duration and response to pests necessitates studying the effects of environment in relation to planting time. Traditional cottons suffered severely with bollworm infestations when sown late in the season and early sown cotton in the season provided highly productive with good quality fibers. Protection from sucking pest can be ensured with suitable plant protection measures. So also the problems of bollworms can be solved very well by transgenic cotton. In the light of these thoughts further advantages of right time of sowing may help to boost productivity of Bt-cotton. Since late sowings are bound to occur under certain situations. Performance under late sown conditions needs to be assessed as regards to the production potentiality, pest reaction and cry protein concentration at varied stages of crop growth. In

Karnataka, large area which was under cotton in command areas of irrigation projects reduced to greater extent due to late sowings caused by late release of canal water. If Bt-cotton proves better under late sown condition due to its insect resistance capacity, more and more area can be brought under Bt-cotton. So area under cotton can be increased to a greater extent.

Cotton in general does not withstand heavy irrigations. Scheduling of irrigation thus become important in cotton since water is valuable, costly and scarce on one hand. On the other excess water encourages more vegetative growth thus discourages the reproductive phase. Excess growth of cotton is conducive for pests and disease attack. It also reduces the flow of air and incidence of sunlight resulting in reduced reproductive growth and finally lower yields (Ved Singh and Nehra, 2001). Irrigation at different moisture regimes also creates a different soil moisture status at different stages of crop. Studies made across the world reported that stress conditions in transgenic cotton and maize are known to reduce their cry protein status. This information helps to understand the effect of different moisture regimes on the cry protein levels and to pest's reactions. Thus, due to different growth habit and duration of Bt-cotton with that of non-Bt cotton, the existing scheduling of irrigation may become improper if the same is followed and there is need to workout the irrigation schedule.

Material and methods

Field experiment was conducted for two years at Agriculture Research Station, University of Agricultural

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