The Pharma Innovation Journal 2023; 12(8): 2499-2500

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(8): 2499-2500

www.thepharmajournal.com
Received: 03-06-2023
Accepted: 08-07-2023

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Effect of fertigation on physiological parameters of *Bt.* cotton (*Gossypium hirsutum* L.)

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Abstract
The present experiment was undertaken to evaluate the effect of fertigation on growth and yield of *Bt.* cotton during 2019–20 at the Soil and Water Management Research Farm, Navsari. The experiment was laid out in a randomized block design with four replications and ten treatments. The results revealed that application of 100% NPK through fertigation (T_1) recorded significantly higher leaf area index, chlorophyll content (SPAD reading) and CGR, but it remained at par with 100% N & K through fertigation with 100% P applied as basal (T_2), 100% N through fertigation with 100% P & K applied as basal (T_3), 80% NPK through fertigation (T_4), 80% N & K through fertigation with 80% P applied as basal (T_5) and 80% N through fertigation with 80% P & K applied as basal (T_6). Lower leaf area index, chlorophyll content (SPAD reading) and CGR were recorded under 60% N fertigation with 60% P and K applied as basal (T_9). Net assimilation rate did not remarkably vary under different levels of fertigation.

Keywords: *Bt.* cotton, drip fertigation levels, water soluble fertilizer, seed cotton yield

Introduction
Cotton is the world's leading fibre crop and known as "white gold," cotton production, processing and trade provide livelihood and employment to several millions of people. The introduction of *Bt.* cotton in 2002, the area under this crop and the number of farmers who adopted this technology expanded significantly year after year. An application of an optimum dose of fertilizer (N, P and K) is important from the production, quality and cost of production point of view. Fertigation is the most effective and convenient means of maintaining optimum fertility levels and water supply according to the specific needs of each crop and type of soil resulting in higher yields and better-quality the crop. Fertigation offers the advantages of saving on fertilizers as well as the increase in fertilizer use efficiency (Nakayama and Bucks, 1986) [4]. Fertigation is the only way to manage these resources efficiently. It is found most important for applying fertilizer at the proper time and as per crop demand. Application of water soluble fertilizers along with irrigation water near the root zone as per the need of the crop, to improve the fertilizer use efficiency. Recently, water soluble fertilizer is available in the market and the solubility of this fertilizer is higher, so less quantity requires and easily apply through a drip system to improve the efficiency of these fertilizers.

Materials and Methods
The field trial was carried out in 2019-20 at Soil and Water Management Research Farm, Navsari. The experiment was laid out in randomized block design with four replications and ten treatments. The treatment consisted of different levels of fertigation *viz*., T_1:100% NPK through fertigation, T_2:100% N & K through fertigation with 100% P applied as basal, T_3: 100% N through fertigation with 100% P & K applied as basal, T_4: 80% NPK through fertigation, T_5: 80% N & K through fertigation with 80% P applied as basal, T_6: 80% N through fertigation with 80% P & K applied as basal, T_7: 60% NPK through fertigation, T_8: 60% N & K through fertigation with 60% P applied as basal, T_9: 60% N through fertigation with 60% P & K applied as basal and T_{10}: 100% NPK applied in soil (As per recommendation). The soils of the experimental unit were clayey in texture, alkaline in nature with normal electrical conductivity, low in organic carbon and available nitrogen, medium in available phosphorus and fairly high in available potassium. Five randomly chosen plants from a net plot were used to collect data on physiological parameters. Data were statistically analyzed by the standard procedure of Panse and Sukhatme (1967) [5].

Results and Discussion

Physiological parameters

Different fertigation treatment significantly influences the leaf area index, chlorophyll content (SPAD reading) and crop growth rate (CGR). Among the drip fertigation levels, fertigation levels at 100% NPK through fertigation (T_1) recorded significantly higher leaf area index, chlorophyll content (SPAD reading) and CGR but, it remained statistically at par with 100% N & K through fertigation with 100% P applied as basal (T_2), 100% N through fertigation with 100% P & K applied as basal (T_3), 80% NPK through fertigation (T_4), 80% N & K through fertigation with 80% P applied as basal (T_5) and 80% N through fertigation with 80% P & K applied as basal (T_6). Lower value of LAI SPAD reading and CGR were registered with 60% N through fertigation with P & K applied as basal (T_9).

LAI values increase mainly due to increases in leaf size and better growth of crop under higher level of fertigation through drip irrigation might have led to effective absorption and utilization of nutrients and better root proliferation resulting in better crop canopy. These results are in partial fulfillment with Jena and Aladakatti (2018) [3] and Gawali *et al.* (2020) [2].

The increase in chlorophyll content was attributing to the fact that nitrogen is an important constituent of chlorophyll; means chlorophyll concentration in leaf is directly related to nitrogen concentration in leaf strongly influences the SPAD values. Increases in the levels of nitrogen may increase the availability of nitrogen and its concentration in leaves, which increases SPAD reading. These results are in conformity with those of Jena and Aladakatti (2018) [2]. Shruti and Aladakatti (2018) [6] indicated that fertigation with higher level of nutrients reported higher SPAD reading.

The data (Table 1) revealed that different levels of fertigation did not remarkably influence the net assimilation rate of *Bt.* Cotton during 30-60 DAS as well as during 60-90 DAS. Application of 100% NPK through fertigation (T_1) registered more net assimilation rate whereas, the lower values of NAR during 30-60 DAS were noted with 100% NPK applied in soil (T_{10}) during both the years of experimentation and in pooled results, respectively.

The crop growth rate and net assimilation rate of *Bt*. cotton crop were influenced by different levels of fertigation and increased with the higher level of fertigation it might be due to more nutrient availability, improve the uptake of nutrients, which directly enhance the accumulation of dry matter production per plant at different growth stage so btained more LAI, amount and intensity of intercepted energy, photosynthetic efficiency and canopy area interaction leads to higher CGR and NAR of *Bt.* cotton crop. The results are akin to those reported by Tank (1995) [7] and Bharath-Raj (2013) [2] in cotton crop.

Table 1: Physiological parameters of Bt. cotton as influenced by different treatments of fertigation

Treatment	Leaf area index		Chlorophyll content (SPAD reading)		CGR (g/m^2/day)		NAR (g/dm^2/day)	
	At 60 DAS	At 90 DAS	At 60 DAS	At 120 DAS	During 30-60 DAS	During 60-90 DAS	During 30-60 DAS	During 60-90 DAS
T_1	0.517	1.49	39.25	44.00	4.73	4.46	0.200	0.079
T_2	0.516	1.47	38.89	43.05	4.66	4.36	0.195	0.078
T_3	0.513	1.40	38.59	42.45	4.63	4.28	0.194	0.079
T_4	0.505	1.39	37.80	42.09	4.49	4.12	0.196	0.078
T_5	0.501	1.38	37.73	41.88	4.44	4.08	0.193	0.077
T_6	0.499	1.38	37.43	41.76	4.40	4.06	0.191	0.078
T_7	0.442	1.03	34.44	38.17	3.70	3.56	0.180	0.080
T_8	0.390	0.96	33.96	37.98	3.64	3.49	0.192	0.089
T_9	0.373	0.95	31.92	36.80	3.63	3.48	0.193	0.090
T_{10}	0.448	1.09	34.44	40.52	3.70	3.59	0.175	0.075
S.Em. ±	0.02	0.06	1.07	1.09	0.22	0.17	0.013	0.005
CD (P= 0.05)	0.06	0.17	3.11	3.18	0.64	0.48	NS	NS
C.V. %	8.50	9.58	5.89	5.37	10.52	8.40	13.67	11.58

Conclusion

In the light of the results obtained from this investigation, it can be concluded that for getting higher physiological parameter of Bt. cotton, the crop should be fertilized with 100% NPK (100% NPK through fertigation, 100% N & K through fertigation with 1000% P applied as basal and 100% N through fertigation with 100% P & K applied as basal) which was on par with 80% NPK through fertigation and saving the 20% of fertilizer.

Reference

1. Bharath-Raj HR. Study on surface irrigation of inter-specific hybrid cotton. Thesis M.Sc. (Agri.), University of Agricultural science, Bangalore, India; c2013. p. 124.
2. Gawali J, Dhamak A, Waikar S. Effect of water-soluble fertilizers through fertigation on growth, yield component and yield of Bt. cotton. International Journal of Chemical studies. 2020;8(5):2635-2638.
3. Jena P, Aladakatti YR. Effect of conventional and water-soluble fertilizers through fertigation on growth, physiology and yield of Bt. cotton. International Journals of current Microbial Application Science. 2018;7:752-759.
4. Nakayama FS, Bucks DA. Trickle irrigation for crop production, design, operation and management. Elsevier Scientific Publishers, Netherlands; c1986. p. 376.
5. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. I. C. A. R. New Delhi; c1967. p. 199-200.
6. Shruti MY, Aladakatti YR. Effect of different levels of irrigation and fertigation on growth, physiology, yield attributes and yield of intra hirsutum Bt cotton. International Journal of Chemical Studies. 2018;6(6):1345-1350.
7. Tank DA. Response of drip irrigation *rabi* cotton (*Gossypium hirsutum* L.) to varying schedules of irrigation and nitrogen levels under South Gujarat conditions. Thesis Ph.D., Gujarat Agricultural University, Navsari; c1995. p. 144.