

Impact of Nitrogen Fertilizer on Newly Developed Cotton Varieties under Sakrand Conditions

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Abstract: A field experiment was conducted during the cotton season 1998 to study the optimum nitrogen requirements of three new cotton varieties developed by Central Cotton Research Institute, Sakrand viz., CRIS-18, CRIS-21 and CRIS-9. The studies concluded that 100 kg N/ha is the optimum requirement of nitrogen fertilizer for these three cotton varieties under Sakrand conditions. More over, the cotton crop did not respond to higher dose of 150 kg N/ha.

Key words: Nitrogen fertilizer, cotton varieties, seedcotton

Introduction

Application of the artificial fertilizer plays an important role in increasing agricultural production. The potential for fertilizer application is quite high in developing countries like Pakistan where its advantages have not so far been fully exploited. In Organic fertilizers offer the most attractive low cost technology of increasing out put per acre and give farmers a high economic return for their labour and capital investment. Moreover, organic fertilizers help to increase the productive efficiency of water and the depth of roots of the crop. Consequently most efforts with regard to the development of technology for agricultural advancement have currently been directed towards the development of cotton varieties at CCRI-Sakrand highly responsive to fertilizer. However, to get the maximum benefit out of fertilizer, we should know the dose and time of application of different kinds of fertilizers, their relative efficiency and proportion in which they should be used. Wahab (1985) concluded that out of total consumption of nutrients in Pakistan, 75 % was nitrogen, 23% phosphorus and 2 % potash. Saleem (1985) claimed that use of nitrogen is more beneficial than P and K. Malik and Malik (1985) carried out experiments to know the difference between the yield due to nitrogen alone and NPK combined. They concluded that nitrogen is more responsible to increase the yield. Khan *et al.* (1987) has also the same findings. Mithaiwala *et al.* (1981) and Rashiduddin *et al.* (1988) concluded that application of nitrogen at the rate of 100 kg N/ha was comparatively more suited for cotton production. Setaton and Simoris (1994) reported that the increase in cotton yield as a result of 'N' fertilization was related to the number of bolls and the boll weight and maturity of cotton plants was related to 'N' fertilization. Cotton crop requires large amount of 'N' particularly under irrigation. The amount of fertilizer 'N' applied to cotton should be sufficient to achieve maximum return of the crop, while avoiding possible problems such as excessive growth, delayed maturity, reduced ginning percentage, greater incidence of disease and greater attractiveness to insect pests. It is also important to minimize the potential contamination of ground water with nitrates from excessive fertilizer use. Keeping the above facts in view, the present study was carried out at CCRI-Sakrand to see the optimum dose of nitrogen requirements for cotton varieties.

Materials and Methods

Effect of different doses of nitrogen on the yield of cotton varieties newly developed by CCRI - Sakrand i.e. CRIS-18, CRIS-21 and CRIS-9 (*G.hirsutum* L.) were studied at Institute's farm during 1998. The crop was planted well in

time, in replicated plots using split plot design. The varieties were treated as main plots where as fertilizers were sub plots. Sowing was done with single row cotton drill. The plants were spaced 22 - 30cm from each other within rows, 75cm apart. Irrigations were applied according to need of the crop. The standard cultural practices were applied to raise crop and insect and pest injury was kept below economic level through regular sprays. Seedcotton yield and its components were recorded at maturity on ten randomly selected plants in each treatment. The seedcotton yield was calculated from harvested plot. The data was subjected to analysis of variance to compare the treatments efficiency. The details of the treatments were as under:

Fertilizer doses

- F₁ = 0 kg 'N' (control with no nitrogen fertilizer)
- F₂ = 50 kg 'N' per ha (½ N at 1st irrigation + ½ N at flowering)
- F₃ = 100 kg 'N' per ha (do)
- F₄ = 150 kg 'N' per ha (do)

Results and Discussion

The data regarding the effect of different fertilizer doses on the yield of seedcotton of three new cotton varieties are presented in Table 1. The yield data revealed that all varieties

Table 1: Effect of different Nitrogen doses of fertilizer on the yield of seedcotton.

Fertilizer dose	Varieties	Yield in kg/ha
F ₁ = 0 kg 'N' /ha	CRIS-18	2267
	CRIS-21	2414
	CRIS-9	2696
	Average	2432a
F ₂ = 50 kg 'N' /ha	CRIS-18	2578
	CRIS-21	2803
	CRIS-9	3214
	Average	2865b
F ₃ = 100 kg 'N' /ha	CRIS-18	2989
	CRIS-21	3028
	CRIS-9	3363
	Average	3127c
F ₄ = 150 kg 'N' /ha	CRIS-18	2705
	CRIS-21	2837
	CRIS-9	3177
	Average	2906b

Different letter indicate significant difference among the treatments at 5 % level based on LSD test

respond with variable significant effect with increasing level of fertilizer. In varietal difference, CRIS-9 behaved better followed by CRIS-21 at all fertilizer levels during the season. From the interpretation of yield relationship between varieties and nitrogen fertilizer levels, it is evident that all varieties responded positively and increased yield with the increase in the dose of nitrogen fertilizer. It is also apparent from the data that by increasing the dose of nitrogen up to 150 kg/ha, the yield of all varieties could not increase but decreased as compared to 100 'N' level and it is also obvious that all varieties produced lowest yield at 0 'N' level. The results conclude that all varieties under the study have potential of producing better yields at the high dose of fertilizer. Setaton (1991) concluded that the results generally indicated a variable degree of increase in the yield as the rate of 'N' application increased depending on the soil and environmental condition. Seedcotton yield at maturity was very much influenced by fertilizer application, thus when no 'N' fertilizer was applied, cotton yield was 1678 kg/ha; however, when 30 or 60 kg N/ha were applied, cotton yields were increased up to 1759 and 1811 kg/ha respectively and this increase was of 5% and 7% as compared to zero 'N' fertilization. This could only be explained, that crop might have an excessive vegetative growth with higher doses of nitrogen, thus delayed fruiting phase, which in turn produced low number of bolls. From the present data of yield difference between 'N' levels, it is concluded that from these varieties without supplementing with nitrogen fertilizer, better yield cannot be obtained. For maximum yield potential, these varieties positively respond to a fertilizer level of 100 kg/ha N. These results are in agreement with the findings of previous research carried out by various researchers like Burhan and Mansi (1970), Sultan and Hanif (1979) Colakaglu (1979), Dressel *et al.* (1982), Malik and Malik (1985) and Saleem (1985).

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