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STUDIES ON INTERACTIVE RELATIONSHIP OF IRRIGATION FREQUENCIES AND FERTILIZER LEVELS IN MUNG (NM·54) UNDER THAL CONDITIONS

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Three fertilizer lev~ls (?-0-0, 27-92-0 and ~4-184-0 NPK kg/ha) and four irrigation frequencies (flowering stage; 30 days after germination (DA?) + flowenng stage; 30 DAG + flowering stage + pod formation stage; flowering stage + 3~ DAG + pod formation + 10 days after pod formation) were evaluated for yield potential of mung. M~g vanety. N~-54 was planted on a sandy loam soil during the four consecutive years (1996-99). The maximum gram YIeld (1573.33 kg/ha) was obtained with four irrigations and a fertilizer dose of 54-184-0 NPK kg/ha.

Key words: fertilizer levels, irrigation frequencies, mung (NM-54)

INTRODUCTION

Legume crops respond more to phosphorus than to nitrogen as compared to non-legume crops. Mungbean is the most important and widely cultivated crop of Thal. However, due to poor soil fertility, low varietal potential, mismanagement of irrigation and imbalanced use of fertilizers, its yield is not only stagnant but also below normal. There is a common notion that legume crop does not need nitrogenous fertilizer for their proper growth. Contrarily, mung researchers have reported that application of both the nitrogenous and phosphoratic fertilizers increased the yield of mungbean. Misra and Gangwar (1987) reported that the highest grain yield of mungbean (1.26 t/ha) was obtained with 8 irrigations. Younis and Ahmad (1988) reported that under rainfed conditions, combined fertilizer application (30-60 NP kg/ha) gave higher seed yield of mungbean than sole application of phosphorus (0-60 NP kg/ha). Similarly, Sarwar (1988) concluded that different yield components of mungbean such as number of pods/plant, number of seeds/pod and 1000-grain weight increased significantly with the application of NPK fertilizer @ 30-90-30 kg/ha:

Sekhon et al. (1990)·studied the influence of different irrigation levels (2, 4 and 6) on the yield of summer mungbean and obtained seed yield of 0.49, 0.79 and 0.93 tJha with 2,4 and 6 irrigations respectively. Dewangan et al. (1992) observed that both the uptake of NP and grain protein contents of mungbean were enhanced with increasing irrigation frequency. Rajput et al. (1992) reported that application of 34-67-0 kg NPKlha gave higher seed yield (803 kg/ha) or mungbean than 0-50-0 kg NPKlha (694 kg/ha) under Bahawalpur conditions. Bachchhar et al. (1993) stated that mungbean irrigated at different critical growth stages i.e. branching, flowering, postflowering and pod development produced seed yield of 1.17, 1.34, 1.65 and 1.48 tJha respectively. Nitrogen uptake was also increased with an increase in irrigation frequency. Singh et al. (1993) reported that grain yield of mungbean was increased by the application of 20 kg N and 40 kg pps, whereas K application had no significant effect. Hussain. (1994) found that application of nitrogen alone or in combination with P and K increased significantly the number of seeds/pod, seed yield/ha over control. Since the soils of Thal region are generally deficient in nitrogen and phosphorus, therefore, the present study was planned to determine the optimum NP level and irrigation requirements of a new mungbean cultivar NM-54 under irrigated conditions on a sandy loam soil of Thal region.

MATERIALS AND METHODS

Field experiments were conducted at the Agronomic Research Station, Karor, District Layyah, during 1996-99. The experiments were laid out in a split plot design with three replications. The net plot size was 3m x 6m. Mung cultivar NM-54 was used as a test crop. Irrigation regimes were kept in main plots and fertilizer levels in subplots. Irrigation regimes comprised 1,2,3 and 4 irrigations applied at flowering (AI); 30 days after germination (DAG) + flowering (A2); 30 DAG + flowering + pod formation (A3) and 30 DAG + flowering + at pod formation + 10 days after pod formation (A4), respectively. The fertilizer levels were 0-0-0 (Ft), 27-92-0 (F_2) and 54-184-0 (F_3) NPKlha. All phosphorus and half of nitrogen in the form of urea and DAP respectively were applied at sowing, while the remaining half of nitrogen was top-dressed with first irrigation. Seed @ 30 kg/ha was drilled with

Table 1. Effect of irrigation frequencies and fertilizer levels on grain yield of mung NM-54 (average of four years data)

	Irrigation frequencies	Grain yield (kg/ha)			
		F1	F2	F3	Mean
		0-0-0 kg NPK/ha	27-92-0 kg NPK/ha	54-184-0 kg NPK/ha	
A1	Onp. imP'RHnn	1001.f\7F	12Rl?2F.	141AFlOn	12:;14.14n
A2	Two irriaations	1041.13F	1480.80D	1649.55C	1390.49C
A3	Three irrieations	1015.45F	1588.34C	1792.69B	1465.49B
A4	~~llrUrieati~	lQ~u4F	16aL~	19&la7Jl	ua3~3A
	Mean	1029.20C	1508.00B	1710.53A	

Table 2. Effect of irrigation frequencies and fertilizer levels on number of pods/plant (average of four years data)

	Irrigation frequencies	Number of pods/plant			
		Fl	F2	F3	Mean
		0-0-0 kg NPK/ha	27-92-0 kg NPK/ha	54-184-0 kg NPK/ha	
Al	One irrigation	12.15F	20.I~E	22.00D	18.nC
A2	Two irrigations	10.35G	23.48D	25.50C	19.77B
A3	Three irrigations	13.67F	22.85D	26.90B	21.14A
A4	Four irrigations	12.40F	24.95C	28.85A	22.85A
	Mean	12.14C	22.86B	25.81A	

Table 3. Effect of irrigation frequencies and fertilizer levels on number of grains/pod (average of four years data)

	Irrigation frequencies	Number of pods/plant			
		FI	F2	F3	Mean
		0-0-0 kg NPK/ha	27-92-0 kg NPK/ha	54-184-0 kg NPK/ha	
Al	One irrigation	8.50L	14.67G	15.38D	12.85D
A2	Two irrigations	9.35K	13.37H	17.21D	13.31C
A3	Three irrigations	10.47J	15.70E	19.85B	15.34B
A4	Four irrigations	12.361	18.00C	23.50A	17.95A
	Mean	10.17C	15.44B	18.98A	

Table 4. Effect of irrigation frequencies and fertilizer levels on pod length (cm) (average of four years data)

	Irrigation frequencies	Pod length (cm)			
		F1	F2	F3	Mean'
		0-0-0 kg NPKlha	27-92-0 kg NPKlha	54-184-0 kg NPKlha	
A1	One irrigation	12.56BC	12.54BC	11.80E	12.30B
A2	Two irrigations	12.29CD	12.25D	12.42CD	12.32AB
A3	Three irrigations	12.50BC	11.85E	12.65BC	12.33AB
A4	Four irrigations	10.45C	12.75B	14.65A	12.62A
	Mean	11.95C	12.35B	12.88A	

a single row hand drill in rows 30 cm apart on a well prepared seed bed. Plant to plant distance was maintained as 10 cm by thinning to obtain uniform plant population in each treatment. The crop was harvested during the 1st week of October each year. The data on number, of pods/plant, number of seeds/pod, pod length and grain yield were recorded. The data were analyzed using analysis of variance technique (Steel and Torrie, 1984). The original fertility status of the experimental soil on average was 0.03% N, 12.07 ppm PP5 and 137 ppm ~O and pH 8.00.

RESULTS AND DISCUSSION

Significant effects of irrigation frequencies and fertilizer levels were observed on grain yield. The highest grain yield of 1573.33 kg/ha was obtained with four irrigations (A4) followed by three irrigations (1465.49 kg/ha). The lowest grain yield (1234.14 kg/ha) was obtained with one' irrigation (Table 1). Similar results were reported by Bachchhar et al. (1993). Regarding fertilizer levels, the highest average grain yield (1710.53 kg/ha) was obtained with the application of 54-184-0 kg NPKlha followed by 27-92-0 kg NPKlha giving 1508.00 kglha. However, all the fertilizer treatments gave higher grain yield than control (1209.20 kg/ha) (Table 1). These results were supported by Hussain (1994).

The interaction between irrigation frequency and fertilizer level was also significant. The maximum grain yield (1980.37 kg/ha) was obtained from plots receiving four irrigations and fertilized @ 54-184-0 kg NPKlha.

Irrigation frequencies had significant effect on number of pods/plant (Table 2). The maximun. pods/plant (24.95) were recorded in plots irrigated four times during the crop season. Fertilizer application also showed significant effect on pods per plant. The maximum number of pods/plant (25.81) was produced by plants fertilized @ 54-184-0 kg NPKlha. Significant response of mungbean to irrigation and fertilizer application has also been reported by Bachchhar et al. (1993).

Data given in Table 3 revealed that the maximum number of grains/pod (17.95) was recorded in A4 treatment and was followed by A3 (15.34). One and two irrigations gave almost similar results. Maximum number of grains/pod (18.98) was produced by F3 treatment where fertilizer was applied @ 54-184-0 kg NPKlha. The interaction between both the factors was also significant. The highest number of grains/pod ,(23.50) was recorded in plots given 4 irrigations and fertilized @ 54-184-0 kg NPKlha.

The data on pod length showed significant increase in pod length with fertilizer application (Table 4), whereas irrigation frequencies did not have significant effect on pod length.'

These results led to the conclusion that irrigation at all critical stages along with combined application of nitrogen and phosphorus in appropriate proportion is important for getting high grain yield of mungbean cultivar NM-54 under irrigated conditions ofThal.

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