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PERFORMANCE OF DIFFERENT COTTON CULTIVARS UNDER COTTON MUNGBEAN INTERCROPPING SYSTEM

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ABSTRACT

In a field study, mungbean (cv. AEM-96) was intercropped with four cotton cultivars to test their suitability for cotton-mungbean intercropping system during 2002 and 2003. With the exception of cv. AEHM-74, the seedcotton yield of NIAB-78, Chandi, and Sohni was considerably affected during both the years and depressed by 29.6, 24.4 and 20.1% compared to their respective sole cropping respectively. However, cotton cv. AEHM-74 interplanted with mungbean produced likely seedcotton harvest to that recorded with monoculture cotton. Among the different cultivars, cotton cv. AEHM-74 was found to be the most compatible for intercropping system because of its outstanding performance and tolerance to abiotic stress.

Key words: Cotton, cultivars, Intercropping, legume, mungbean, sole cropping

INTRODUCTION

The practice of mixed cropping is common to farmers throughout the semi-arid region. Kass (1978) demonstrated substantial increases in crop production compared to monocropping. Some studies on cotton and mungbean intercropping have depicted that these two crops can successfully be grown to produce both legume and cotton more efficiently than growing them separately (Mafra *et al.*, 1981). Maximum benefits are realized when component crops have the least competition and these can be achieved by utilizing the row space of cotton without reducing the density and without changing the sowing time to ensure maximum utilization of resources by the mungbean crop. Sindagi (1982) was of the view that intercropping brings higher returns due to efficient utilization of space, light, water and nutrients by intercrops. Although there can be slight yield reduction in major crop component but the additional income from legume crop increases the total income per unit area. Thus intercropping gives higher net income per hectare than the sole cropping (Ibrar, 1995). The practice of intercropping can be made more advantageous by the use of improved crop varieties (Andrew, 1974). The present study was, therefore, undertaken to evaluate the performance of different cotton cultivars for enhancing the crop productivity without causing any reduction in the yield of dominant component compared to their monoculture checks.

MATERIALS AND METHODS

A field study was conducted at the Experimental Farm, Nuclear Institute of Agriculture (NIA), Tandojam for two consecutives years i.e., from 2002 - 2003 to evaluate the performance of different cotton cultivars when planted under an intercropping system with mungbean. The experimental site was silt loam in texture, non-saline in nature, (ECe 1.02 dS $m^{-1)}$, low in organic matter (0.82%), total N (0.04%) and Olsen's P (6.4 µg g^{-1}). The experiment was laid out in Randomised Complete Design with four repeats having eight treatments comprising of four cotton cultivars viz. NIAB-78, Chandi, Sohni and AEMH-74 when grown alone or intercropped with mungbean cv. AEM-96.

Each cotton cultivar was sown at an inter-row spacing of 80 cm whereas mungbean (AEM-96) was centred in between the cotton rows as supplementary crop. Phosphorus as triple superphosphate and potassium as sulphate of potash were applied @ 80 and 50 kg ha^{-1}, respectively to all the treatments uniformly as a basal dose. Nitrogen @ 120 kg ha^{-1} was applied as urea to all the treatments in two equal splits i.e. half at sowing and half at first irrigation. Competition between cotton cultivars and mungbean for available sources continued for 65 days, afterward mungbean was harvested. The cotton harvest was completed in two consecutive pickings and yield data of both crops were recorded. The results obtained were subjected to statistical analysis using methods prescribed by Steel and Torrie, 1980. The differences among the treatments means were compared by using DMR test (Duncan, 1970).

RESULTS AND DISCUSSION

Seedcotton yield:

Compared to monocropping, the performance of different cotton cultivars was variably affected under intercropping system (Table 1). With the exception of cv. AEHM-74, the seedcotton yield of NIAB-78, Chandi and Sohni was depressed by 29.6, 24.4 and 20.1%, respectively compared to their respective monocultures. Our results are in close agreement to those reported by Natarajan and Naik (1992). In one of the studies with legume and cotton intercropping, they suggested that legume being strongly competitive reduced the cotton yield when grown as an intercrop, because cotton crop had to depend on moisture available in the soil. It is probable that there would have been less soil moisture in soil under intercropping because of additional demands by the legume. There was no competitive effect on cotton cultivar AEHM-74 due to mungbean intercropping as it produced similar seedcotton yield to that of monoculture check. This might attributed to less moisture requirement of said mungbean variety. Since cotton cv. AEHM-74 in intercropping with mungbean led to enhanced crop productivity without any depression in seedcotton harvest, hence it may be considered as the first choice for intercropping with low canopy legumes with specific to mungbean.

Table 1. Seedcotton yield as influenced by different cotton-mungbean intercropping systems.

Treatments	Seedcotton Yield (tons ha^{-1})		
	2002	2003	Mean
NIAB-78 alone	4.29 b	3.86 a	4.07 b
NIAB-78 + mungbean	3.39 e	2.89 c	3.14 e
Chandi alone	4.07 c	3.40 b	3.72 cd
Chandi + mungbean	3.19 f	2.80 c	2.99 e
Sohni alone	5.08 a	3.98 a	4.53 a
Sohni + mungbean	4.27 b	3.27 b	3.77 c
AEHM-74 alone	3.71 d	3.37 b	3.54 d
AEHM-74 + mungbean	3.70 d	3.47 b	3.59 cd

Means followed by different letters in same column are significantly different from each other at 5% level of significance.

Mungbean yield:

The results showed that different cotton cultivars influenced the yield of mungbean variably when it was interplanted within the rows of these cultivars. The maximum and significantly highest mungbean yield for both the years (0.96 tons ha^{-1}) was observed when it was interplanted with cv. Sohni whereas the lowest grain yield (0.58 tons ha^{-1}) was obtained when it was interplanted with Chandi. It can be inferred from the data that the yield response of mungbean in intercropping system with different cotton varieties was greatly influenced and different levels of competition for available resources existed between mungbean and the cotton cultivars (Table 2).

Table 2. Mungbean yield as influenced by different cotton-mungbean intercropping systems.

Treatments	Mungbean Yield (tons ha^{-1})		
	2002	2003	Mean
NIAB-78 + mungbean	0.85 b	0.40 c	0.63 c
Chandi + mungbean	0.78 c	0.38 c	0.58 d
Sohni + mungbean	1.05 a	0.88 a	0.96 a
AEHM-74 + mungbean	1.08 a	0.68 b	0.88 b

Means followed by different letters in same column are significantly different from each other at 5% level of significance.

Combined yield:

The combined harvests were variably affected depending upon the varietal behaviour and potential to yield under stress conditions (Table-3). Among different cultivars, cotton cv. Chandi and NIAB-78 performed betterly when grown as monoculture but poorly when cropped under intercropping systems. Significantly highest combined yield to the tune of 4.73 tons ha^{-1} was recorded with simultaneous plantation of Sohni and mungbean but it was only 4% higher than its corresponding sole cropping system. Cotton cv. Sohni out yielded all the cotton cultivars under investigation and performed efficiently under sole cropping system but it may not be considered as a better choice for intercropping since it could not withstand the stress situations and reduced its yield by 17% when planted

simultaneously with mungbean. Out of various systems, cotton cv. AEHM-74 and mungbean cv. AEM-96 proved to be the best intercrop combination as both of them showed a potential to tolerate the stress environment and produced 26% higher yield than their respective monocultures. Similar findings were recorded by Reddy *et al*., during 1990, while working on genotypic effects in millet/cowpea intercropping in the semi-arid tropics of Niger.

Table 3. Combined yield as influenced by different cotton- mungbean intercropping systems.

Treatments	**Seedcotton + Mungbean Yield (tons ha^{-1})**		
	2002	**2003**	**Mean**
NIAB- 78 alone	4.29 c	3.86 b	4.07 b
NIAB –78 + mungbean	4.24 cd	3.29 c	3.77 c
Chandi alone	4.07 d	3.40 b	3.72 cd
Chandi + mungbean	4.07 d	3.18 c	3.58 de
Sohni alone	5.08 a	3.98 b	4.53 b
Sohni + mungbean	5.31 a	4.16 a	4.73 a
AEHM- 74 alone	3.71 f	3.37 b	3.54 e
AEHM-74 + mungbean	4.78 b	4.15 a	4.47 b

Means followed by different letters in same column are significantly different from each other at 5% level of significance.

CONCLUSION

It is concluded that different cotton cultivars behaved variably under cotton-mungbean intercropping system. However, performance of AEHM-74 was altogether different since it produced likely seedcotton yield to that of monoculture cotton. Cotton cv. AEHM-74 and mungbean cv. AEM-96 interplanted led to additional harvest of 26% as compared to sole cotton crop.

REFERENCES

Andrews, D.J. (1974). Response of sorghum varieties to intercropping. *Experimental Agriculture*, 10: 57-63.

Duncan, D.B. (1970). Multiple range and Multiple F. tests. *Biometrics*, 11:1-42.

Ibrar, R. (1995). *Feasibility of summer legumes intercropping in sunflower under rainfed conditions*. M. Sc. Thesis, Department of Agronomy, Barani Agricultural College, University of Agriculture, Faisalabad, Pakistan.

Kass, D.C.L. (1978). Polyculture cropping system: Review and analysis. *Cornell International Agricultural Bulletin*, 32.

Mafra, R.C., M. de A. Lira, A.S.S. Arcoverdo, G. Roberio and M.A. Faris (1981). Studies on the intercropping of sorghum and corn with Phaseolus beans (*Phaseolus vulgaris*) and cowpea (*Vigna unguiculata)*. In: *Proceedings of the International Workshop on Intercropping*, 10-13 Jan. 1979, Hyderabad, India: (Ed. R.W. Willy), Patancheru, AP 502234, India: ICRISAT, pp. 46-51.

Natarajan, M. and D. M. Naik (1992). Competitive effect of a short duration, bush type cowpea when intercropped with cotton in Zimbabwe. *Experimental Agriculture*, 28: 409-416.

Reddy, K.C., J.V.D. Ploeg and I. Maga (1990). Genotype effects in millet/cowpea intercropping in the semi-arid tropics of Niger. *Experimental Agriculture*, 26: 387-396.

Sindagi, S. S. (1982). *Production technology for sunflower*. Oxford press, New Delhi pp. 96.

Steel, R. G. D. and J. H. Torrie (1980). *Principles and procedures of statistics*. 2nd Ed. McGraw Hill, Book Co. Inc. New York, pp: 187.

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