



CORRELATION STUDIES ON YIELD AND YIELD ATTRIBUTING CHARACTERS OF MAIZE UNDER DIFFERENT WEED CONTROL PRACTICES IN INTERCROPPING OF MAIZE AND URDBEAN

^aMallikarjuna, G.B., ^bManjunath T. R. & ^cMegeri, S.M.

^aDepartment of statistics, University of Agricultural Sciences, GKVK, Bangalore 560065, Karnataka .

^bDepartment of Economics, Kuvempu University, Shivamogga 577451 Karnataka

^cDepartment of statistics UAS, Dharwad Karnataka

ABSTRACT

Imposition of weed control practices such as Hand weeding at 25 DAS, Alachlor @ 2 kg/ha and Alachlor@1.5 kg/ha + Hand weeding at 40 DAS in the sole and intercropping row ratios of Maize and Urdbean caused for better growth in yield attributing characters as well as grain yield. This resulted in positive significant correlation between yield and yield attributing characters. In addition to above presence of the companion crop (Urd bean) also caused for better grain yield in intercropping row ratios of 1:1, 2:1 and 2:2 and also better yield attributing characters, more particularly in 2:2 row ratio of maize urdbean intercropping. All the yield attributing characters such as Cob weight (gms), 100 seed weight (gms), Straw yield (ton/ha) and Plant height (cms) in the row ratio (2:2) tried with integrated weed management practice of Alachlor@1.5 kg/ha + Hand weeding at 40 DAS have recorded positive significant correlation with grain yield.

KEYWORDS: weed control, intercropping, companion crop, weed management etc.

INTRODUCTION

Yield component in any crop is the resultant of various yield attributing components within the plant in addition to environmental factors. Knowledge of relationship among the characters will not only give the extent of association between them but also the extent of their effect on seed yield. Information on relationship between the characters is very much needed to know the potentiality of the agronomic practices. Intercropping will always have an edge over the pure cropping pattern, since they will effectively utilize the available resources. To sustain the Soil health, inclusion of legume in rotation or raising them in association with cereal crop has been advocated by various workers over the years. Idea behind consideration of legume crop is because; it not only fixes nitrogen for its use but could provide part of nitrogen to companion crop. Rising of legume as companion crop will be boon to the main crop, will enhance the productivity in main crop by boosting the value of yield attributing characters, which in turn cause for the enhancement in the productivity of the main crop. Many studies are being done to know the extent of relationship of yield with its attributing characters under sole crops. Since limited information is available on the correlation of yield and its attributing characters of a main crop under intercropping, present study has been attempted to study its significance by having the intercropping of Maize-Urd bean intercropping. As a supplemental study different weed control methods were tried simultaneously to know their effectiveness in intercropping. Correlation study of yield and its attributing characters of maize pertains to each of the treatments of sole, different row ratio intercropping and weed control practices.

MATERIAL AND METHODS

A field experiment was conducted during *Kharif* seasons of 2003 to 2005 consecutively under rain fed situation of

Agricultural Research Station, Kathalagere under the jurisdiction of University of Agricultural Sciences Bangalore. The experiment is considered by having treatment combinations of different intercropping viz., sole crops of Maize, Urd bean, intercropping of 1:1, 2:1 and 2:2 row ratios of Maize + Urdbean with four weed control methods viz., Weedy check, Hand weeding at 25 DAS, Alachlor @ 2 kg/ha and Alachlor@1.5 kg/ha + Hand weeding at 40 DAS. Data generated from the experiment were considered for the study of correlation. The experiment is laid out in split plot design with 3 replications for each treatment combination of five planting pattern and four weed control methods. Lay out is made by having Weed control practices on the main plot and sole/intercropping treatment on the sub plot. The experimental site was situated at an elevation of 561 m above the mean sea level with a latitude of 13° 21' N and longitude of 76° 51' E. The soil of the experiment site was red loamy in texture having P^H of 6.8, EC of 0.18 ds/m, OC of 0.64%, available NPK were 292, 28.5 and 195 kg/ha, respectively. Maize cv. Pioneer Hybrid and Urdbean variety Rashmi (LBG-625) were sown with recommended spacing for the sole crops and spacing as framed for the intercropping treatment combinations. Intercrops were taken in additive series without sacrificing the specified plant density. The crops were raised by following the recommended package of practices. Total fertilizer dose required were provided to the crops as per the specified schedule of N, P₂O₅ and K₂O in the form of DAP and Muriate of potash. Need based plant protection measures were under taken as and when diseases and pests were noticed. Simple correlation coefficients between the yield and yield attributing characters of maize yield for each of the treatment under each weed control methods were worked out as suggested by Gomez and Gomez (1983). Correlation coefficient for maize yield and its

attributing characters for sole maize, maize in 1:1, 2:1 and 2:2 row ratios of maize and urdbean intercropping were worked, as it has been considered as the main crop. Correlation coefficient for the urdbean in the intercropping not attempted, since it is taken as a component crop and soil property enricher. The results realized for the mean and the correlation coefficient values are presented separately for the treatments sole Maize. Maize and Urd in the row ratio of 1:1, 2:1 and 2:2 under each of the weed control practices tried in table 1 and 2.

RESULTS AND DISCUSSION

Result under the weedy check (unweeded) revealed that, Maize mean seed yield values have been reduced in all the intercropping patterns such as 1:1, 2:1 and 2:2 row ratios compared to the sole maize. Mean maize seed yield realized for the 1:1, 2:1 and 2:2 row ratios intercropping are 35.97, 39.27, and 36.97 q/ha respectively against 40.33 q/ha, mean yield of sole maize (Table 1). Similar type of reduction in the mean values noticed in the weedy check for the yield attributing characters such as Cob weight (gms), 100 seed weight (gms), Straw yield (ton/ha) and

Plant height (cms) of the 1:1, 2:1 and 2:2 row ratios intercropping compared to the sole maize. Cob weight realized low weight of 509.44, 504.22 and 497.89 gms respectively for 1:1, 2:1 and 2:2 row ratios intercropping compared to 521.67 gms of sole maize. 100 seed weight (gms) also noticed low weight of 34.37, 35.82 and 36.88 gms in 1:1, 2:1 and 2:2 row ratios intercropping compared to 37.47 gms of sole crop. Lower straw yield of 79.44, 68.79 and 83.33 ton/ha was noticed in 1:1, 2:1 and 2:2 row ratios intercropping compared to 94.78 ton/ha of sole crop. Low height in Plant height is also recorded in intercropping row ratios (173.22, 180.78 and 188.44 cms respectively for 1:1, 2:1 and 2:2 row ratios compared to 197.56 cms of sole crop (Table1). Results under the Hand weeding practice (weeded) revealed that, mean seed yield values were found to increase in all the intercropping patterns such as 1:1, 2:1 and 2:2 row ratios compared to the sole maize. Mean maize seed yield realized for the 1:1, 2:1 and 2:2 row ratios intercropping are 57.99, 60.30 and 61.89 q/ha, respectively against 53.09 q/ha mean yield of sole maize (table 1).

TABLE 1. Mean of yield and yield attributing characters realized under different weed control practices and Sole/intercropping row ratios

Treatments		Maize yield (q/ha)	Cob weight (gms)	100 seed weight (gms)	Stover yield (ton/ha)	Plant height (cm)
Weed Control Practices	Sole/intercropping					
Weedy check	Sole Maize	40.32	521.67	37.67	94.78	197.55
	1:1	35.97	509.44	34.37	79.44	173.22
	Maize and Urd bean 2:1	39.26	504.22	35.82	68.89	180.77
	Maize and Urd bean 2:2	36.97	497.89	36.88	83.33	188.44
	Maize and Urd bean					
Hand weeding	Sole Maize	53.09	541.67	35.82	86.67	186.33
	1:1	57.99	624.44	37.05	95.56	191.22
	Maize and Urd bean 2:1	60.30	662.55	38.70	107.22	202.78
	Maize and Urd bean 2:2	61.89	692.89	39.27	113.11	211.44
	Maize and Urd bean					
Alachlor @ 2kg/ha	Sole Maize	53.71	660.56	36.73	74.60	173.44
	1:1	59.84	687.00	38.97	79.34	184.67
	Maize and Urd bean 2:1	60.64	828.89	42.13	85.52	200.44
	Maize and Urd bean 2:2	62.83	852.89	47.27	96.22	207.89
	Maize and Urd bean					
Alachlor @ 1.5kg/ha + Hand weeding at 40 DAS	Sole Maize	62.54	884.11	38.32	90.72	188.27
	1:1	62.94	933.89	39.79	94.73	200.51
	Maize and Urd bean 2:1	63.28	974.44	40.57	100.84	207.64
	Maize and Urd bean 2:2	65.75	1011.11	41.08	103.38	215.93
	Maize and Urd bean					

In Hand weeding practice , it could also noticed an increase in mean values for the yield attributing characters such as Cob weight (gms), 100 seed weight (gms), Straw yield (ton/ha) and Plant height (cms) in 1:1, 2:1 and 2:2 row ratios intercropping compared to the sole maize. Cob weight realized 624.44, 662.56 and 692.89 gms respectively for 1:1, 2:1 and 2:2 row ratios intercropping compared to 541.67 gms of sole maize. 100 seed weight (gms) also recorded weight of 37.05, 38.70 and 39.27 gms in 1:1, 2:1 and 2:2 row ratios intercropping compared to 35.82 gms of sole crop. Higher straw yield of 95.56, 107.22 and 113.11 ton/ha was recorded in 1:1, 2:1 and 2:2 row ratios intercropping compared to 86.67 ton/ha of sole crop. Higher plant height of 191.22, 202.78 and 211.44 cms was also recorded in 1:1, 2:1 and 2:2 row ratios compared to 186.33 cms of sole crop (Table1). Chemical weeding practice Alachlor @ 2kg/ha revealed that, mean seed yield values were found to increase in all the intercropping patterns such as 1:1, 2:1 and 2:2 row ratios compared to the sole maize. Mean maize seed yield realized for the 1:1, 2:1 and 2:2 row ratios intercropping are 59.84, 60.64 and 62.83 q/ha respectively against 53.71 q/ha mean yield of sole maize (Table1). In chemical weed control practice Alachlor @ 2kg/ha, also be noticed, increase in mean values for the yield attributing characters such as Cob weight (gms), 100 seed weight (gms), Straw yield (ton/ha) and Plant height (cms) in 1:1, 2:1 and 2:2 row ratios intercropping compared to the sole maize. Cob weight realized was 687.00, 828.89 and 852.89 respectively in 1:1, 2:1 and 2:2 row ratio intercropping compared to 660.56 gms of sole maize. Higher 100 seed weight (gms) of 38.97, 42.13 and 47.26 gms was also recorded in 1:1, 2:1 and 2:2 row ratios intercropping compared to 36.73 gms of sole crop. Higher straw yield of 79.34, 85.52 and 96.22 ton/ha was also recorded in 1:1, 2:1 and 2:2 row ratios intercropping compared to 74.6 ton/ha of sole crop. Higher plant height of 184.67, 200.44 and 207.89 cms was recorded 1:1, 2:1 and 2:2 row ratios respectively compared to 173.44 cms of sole crop (Table1). Integrated weed control practices Alachlor @ 1.5kg/ha + hand weeding at 40 days after sowing revealed that, mean seed yield values were found to increase in all the intercropping patterns such as 1:1, 2:1 and 2:2 row ratios compared to the sole maize. Mean maize seed yield realized for the 1:1, 2:1 and 2:2 row ratios intercropping are 62.94, 63.28 and 65.75 q/ha respectively against 62.54 q/ha, mean yield of sole maize (Table1). Integrated weed control practices Alachlor @ 1.5kg/ha + hand weeding at 40 days after sowing, noticed an increase in mean values for the yield attributing characters such as Cob weight (gms), 100 seed weight (gms), Straw yield (ton/ha) and Plant height (cms) in 1:1, 2:1 and 2:2 row ratios intercropping compared to the sole maize. Cob weight realized 933.89, 974.44 and 1011.11 gms respectively for 1:1, 2:1 and 2:2 row ratios intercropping compared to 884.11 gms of sole maize. Higher 100 seed weight (gms) of 39.79, 40.57 and 41.08 gms was noticed in 1:1, 2:1 and 2:2 row ratios intercropping compared to 38.31 gms of sole crop. Higher straw yield of 94.73, 100.84 and 103.38 ton/ha recorded in 1:1, 2:1 and 2:2 row ratios intercropping compared to 90.72 ton/ha of sole crop. Plant height also recorded 200.51, and 207.64 and 215.93 cms,

respectively for 1:1, 2:1 and 2:2 row ratios compared to 188.27 cms of sole crop (Table 1). Results presented in Table 2 for sole and intercropping row ratios under all the four weed control practices for correlation between yield and yield attributing characters such as Cob weight, 100 seed weight, straw yield and plant height indicated presence of positive correlation. This indicated increase/decrease in the yield corresponding to an increase/decrease in the yield attributing characters In weedy check it could be observed that, Maize yield is having positive significant correlation with straw yield (0.676) and plant height (0.718) in sole crop, 100 seed weight (0.756) and Cob weight (0.720) have positive significant correlation with yield in intercropping treatment 1:1, straw yield (0.805) has positive significant correlation in intercropping treatment 2:1, where has in 2:2 intercropping treatment straw yield (0.828) and plant height (0.715) have significant positive correlation (Table 2). Results presented in the Table 2 under hand weeding revealed that, Maize yield is having positive significant correlation with cob weight (0.685), 100 seed weight (0.703) and Plant height (0.681) in sole crop. Yield in intercropping row ratio 1: 1 has positive significant correlation with all the yield attributing characters, *ie.*, 0.697, 0.680, 0.849 and 0.683 respectively. Maize yield in 2:1 row ratio is having positive significant correlation with all the yield attributing characters, *ie.*, 0.680, 0.694, 0.758 and 0.744 respectively. Similarly maize yield in 2:2 row ratio is having positive significant correlation with all the yield attributing characters, *ie.*, 0.706, 0.759, 0.713 and 0.687 respectively. In chemical weed control practice of Alachlor @ 2kg/ha. Maize yield is having positive significant correlation with cob weight (0.685), 100 seed weight (0.692) and straw yield (0.805) in sole crop. Yield in intercropping row ratio 1: 1 has positive significant correlation with all the yield attributing characters, *ie.*, 0.693, 0.697, 0.781 and 0.703 respectively. Maize yield in 2:1 row ratio is having positive significant correlation with all the yield attributing characters, *ie.*, 0.684, 0.686, 0.722 and 0.812 respectively. Similarly maize yield in 2:2 row ratio is having positive significant correlation with all the yield attributing characters, *ie.*, 0.732, 0.786, 0.799 and 0.721 respectively (Table 2). In integrated weed control practice of Alachlor @ 1.5kg/ha + hand weeding at 40 days after sowing it could be observed that, Maize yield is having positive significant correlation with cob weight, 100 seed weight, straw yield and plant height *ie.*, 0.680, 0.791, 0.722 and 0.797 respectively in sole crop. Yield in intercropping row ratio 1: 1 has positive significant correlation with all the yield attributing characters, *ie.*, 0.690, 0.710, 0.750 and 0.725 respectively. Maize yield in 2:1 row ratio is having positive significant correlation with all the yield attributing characters, *ie.*, 0.695, 0.683, 0.699 and 0.756 respectively. Similarly maize yield in 2:2 row ratio is having positive significant correlation with all the yield attributing characters, *ie.*, 0.761, 0.756, 0.683 and 0.687 respectively (Table 2). Since Weedy check is an unweeded treatment in the experiment, presence of the weed competition with the main crop in the field is naturally more, wider row spacing compared to the sole crop makes way for higher weed growth and have competition for the resources. This causes low values for

the yield and yield attributing characters of intercropping compared to sole crop in which the spacing is not so wide. In view of weed competition, only few yield attributing characters are having positive significant correlation. hand weeding, chemical weeding by Alachlor @ 2 kg/ha and integrated weed control practice of Alachlor @ 1.5kg/ha + hand weeding at 40 days after sowing minimized the

weeds to a greater extent, providing of wider row ratio and remains of the companion crop (Urd bean) after its harvest caused for substantial increase in values of yield and its attributing characters compared to sole crop. This helps in having positive relation of maize yield with its attributing characters in the intercropping row ratios.

TABLE 2. Correlation of yield and yield attributing characters realized under different weed control practices and Sole/intercropping row ratios

WCP	Treatments	Cob weight (gms)	100 seed weight (gms)	Stover yield (ton/ha)	Plant height (cm)
Weedy check	Sole Maize	0.206	0.600	0.676	0.718*
	1:1				
	Maize and Urd bean	0.566	0.756*	0.720*	0.291
	2:1				
	Maize and Urd bean	0.508	0.617	0.805*	0.561
Hand weeding	2:2				
	Maize and Urd bean	0.376	0.641	0.828*	0.715*
	Sole Maize	0.685*	0.703*	0.505	0.681*
	1:1				
	Maize and Urd bean	0.697*	0.680*	0.849*	0.683*
Alachlor @ 2kg/ha	2:1				
	Maize and Urd bean	0.680*	0.694*	0.758*	0.744*
	2:2				
	Maize and Urd bean	0.706*	0.759*	0.713*	0.687*
	Sole Maize	0.685*	0.692*	0.805*	0.440
Alachlor @ 1.5kg/ha + Hand weeding at 40 DAS	1:1				
	Maize and Urd bean	0.693*	0.697*	0.781*	0.703*
	2:1				
	Maize and Urd bean	0.684*	0.686*	0.722*	0.812*
	2:2				
DAS	Maize and Urd bean	0.732*	0.786*	0.799*	0.721*
	Sole Maize	0.680*	0.791*	0.772*	0.797*
	1:1				
	Maize and Urd bean	0.690*	0.710*	0.750*	0.725*
	2:1				
DAS	Maize and Urd bean	0.695*	0.683*	0.699*	0.756*
	2:2				
DAS	Maize and Urd bean	0.761*	0.756*	0.683*	0.687*

- Significant at 5% level of significance

Except Stover yield in hand weeding and plant height in Alachlor @ 2kg/ha, all other yield attributing characters have positive significant correlation with maize yield. In case of integrated weed control practice of Alachlor @ 1.5kg/ha + hand weeding at 40 days after sowing all the yield attributing characters are found to have positive significant correlation with maize yield in the sole/intercropping row ratios. In horse gram Sood, *et.al.*(1994) and Roopa Devi, *et.al.*(2002) reported significant positive correlation between yield and its attributing characters in the sole crop. Bupesh Kumar and Mishra (2005) also observed yield per plant having high positive correlation with attributing characters like number of pods/plant and plant height in Urdbean, whereas number of seeds/pod showed significant negative correlation with yield. Shiva Reddy *et al.* (2004) revealed that significant positive correlation of pod yield with height and fresh weight of roots in French bean. While, dry weight of haulms showed negative association. Parmeet Singh *et al.* (2007) assessed winter maize with the

relationship amongst weed parameter; yield attributes and yields under the influence of different weed management practices. Grain yield of winter maize showed a significant positive correlation with WCE (weed control efficiency), number of cobs and cob length. From the above findings of correlation between the yield and yield attributing characters, it could be inferred that yield as well as yield attributing characters are increased in their values in the weed treated plots compared to the weedy check. It can also be said that the increase may also due to addition of nutrients from companion crop. Among the different row ratios tried, mean yield realized under paired row of maize with two rows of urd tried with integrated weed management practice such as **Alachlor @ 1.5kg/ha + hand weeding at 40 days after sowing** will have positive significant correlation with all the yield attributing characters and this has caused for the betterment of productivity in that row ratio by recording high productivity of 65.75 q/ha compared to others.

REFERENCES

- Bupesh Kumar & Mishra, M.N. (2005) Correlation and path analysis in urdbean. *Ann. Agric. Res. New Series*, 26 (2): 177-178.
- Gomez, K.A. & Gomez, A.A. (1983) Statistical procedures for agricultural research. John Wiley and Sons series, Second edition
- Parmeet Singh, Prshotam Singh & Joy Dawson (2007) Correlation and regression studies of winter maize and weed interactions. *Indian J. Weed Sci.*, 39 (1&2):21-23.
- Roopadevi, V. D., Vishwanath, A. P., Shivakumar, H. K. & Devakumar, N. (2002) Correlation and regression studies in Horesegram (*Macrotyloma uniflorum* Lam.Verde.). *The Mysore Journal of Agricultural Science*, V01.36:208-211
- Shiva Reddy, N., Krishnappa, K.S. & Anjanappa, M. (2004) Correlation studies in French bean. *The Mysore Journal of Agricultural Science*, 38(1):121-122.
- Sood, B. C., Gartan, S. L & Kalla, N. R. (1994) Variability, correlation and path studies horse gram. *Indian J. Pulses Res.*, 7:68-69