Amrendra Kumar, International Journal of Advances in Agricultural Science and Technology,
Vol.2 Issue. 2, February- 2014, pg. 64-68 ISSN: 2348-1358

Effect of Intercropping in Winter Maize for Higher Production Potential in Northern Bihar

Amrendra Kumar
Rajendra Agricultural University, Pusa, Bihar
E-mail: amrendra7009@gmail.com

Abstract: ***A field experiment was conducted at TCA farm, Dholi, a campus of Rajendra Agricultural University, Pusa (samastipur) Bihar during winter season 2003-04 to evaluate the production potential and economic feasibility in maize based cropping system. The experiment consisted of 11 treatments was planted on 22.11.2003. The experiment was conducted in RBD design with 3 replications. Perusal of data of experiment conducted revealed that maize grown as sole secured highest plant height, LAI, Drymatter accumulation No. of grain/cob, test wt, grain yield, Harvest index. Data revealed that sole maize(T_1)secured highest all the parameter viz. plant height, LAI, Drymatter accumulation test wt, grain yield ,harvest index. Among intercrops T_8-maize + 1 row radish, showed better growth, better expression plant height, LAI, Drymatter accumulation test wt, grain yield, harvest index than when intercropped with potato, rajmash, pea and fababean.***

Introduction

India is the fourth largest economy in the world. Agriculture continues to be the most important sector of Indian economy providing employment and livelihood to nearly 70% of the total population. About 2.5 million ton of additional food grains are required annually in the next 10 years to meet the demand of the growing population. Land is fixed but population are increasing day by day. To feed the rising population with limited land holding is a huge challenge for farmers and agriculture scientist. Intercropping is a part of crop diversification. Indian agriculture is now facing second generation problems like raising or lowering of water table, nutrient imbalance, soil degradation, salinity, resurgence of pests and diseases, environmental pollution and decline in farm profit. Intercropping shows lot of promise in alleviating these problems through fulfilling the basic needs and regulating farm income, withstanding weather aberrations, controlling price fluctuation, ensuring balanced food supply, conserving natural resources, reducing the chemical fertilizer and pesticide loads, environmental safety and creating employment opportunity. Intercropping is the best device to achieve optimum utilization of soil, water and sunlight both in time and space. The two major advantage of intercropping are high productivity and greater production stability through efficient utilization of solar energy, moisture, nutrient and human resource. There is ample scope of utilizing the vacant wider inter row space during the initial slow growth period of the crop by introducing some compatible crop and adjusting the crop geometry for increased productivity, hence due to the long duration nature of maize short crop like potato,

radish, rajmash, pea, fababean may be generally used (Sharma,V.M,:Chakur,I.S.and Manchanda A.K., 1998). Potato can be profitably grown as intercrop with winter maize. (Prasad and Prasad 1988). Intercropping or mixed cropping is a traditional system of growing of two or more crops simultaneously to improve the soil productivity and farm income. Intercropping is increasingly recognized all over the world as the best device to achieve optimum utilization of soil, water, nutrient and sunlight in time and space. Singh(1991) has reported the possibility of intercropping rabi maize with rajmsh with distinct advantage.

MATERIALS AND METHODS

A field experiment was undertaken at TCA farm, Dholi, a campus of Rajendra Agricultural University, Pusa (Samastipur) Bihar during winter season 2003-04 to evaluate the Production Potential and Economic Feasibility in Maize based cropping system. The experimental site was sandy loam having soil pH 8.4 and 213.0, 17.9 and 103.0 kg available N, P2O5, K2O/ha respectively. The experiment laid out in RBD design with 3 replications. of plot size, gross (30 m) and net (24 m) and 11 treatments i.e T1: pure maize at 60 cm; T2: maize at 75 cm + 1 row rajmash; T3: maize at 75 cm + 2 row rajmash; T4: maize at 75 cm + 1 row potato; T5: maize at75 cm + 2 row potato; T6: maize at 75 cm + 1 row pea; T7: maize at75 cm + 2 row pea; T8: maize at 75 cm + 1 row radish; T9: maize at 75 cm + 2 row radish; T10: maize at75 cm + 1 row fababean; T11: maize at 75 cm + 2 row fababean ,was planted on 22.11.2003.All the crops were grown with recommended package and practices. Certified seeds of different crops were used in the experiment. Before sowing all seeds were treated with SAFF (Carbendazim + Mancozeb) @3g/kg seed to protect the crops from seed borne diseases. The recommended dose of fertilizer for maize, rajmash, potato, pea, radish and fababean were applied as per treatment in the experiment. Urea, DAP, MOP, where used as source of nitrogen, phosphorus and potassium, respectively. One third of Nitrogen, with full quantity of phosphorus and potassium were applied as basal dressing prior to sowing in the furrow opened just by the side deeper them the seed furrow to maize. Rest of the nitrogen for maize was applied in 2 equal split at knee height stage and one 3rd at tasseling stage. In pea and fabbabean 100kg (18:46:0 N:P:K Kg/ha) was applied at the time of sowing in furrow opened. Just by the side and dipper the seed furrows. In Rajmash, Potato and Radish half of the Nitrogen and full dose of phosphorus and potassium wayside deeper then the seed furrows as per treatments at planting and remaining amount of nitrogen was applied separately by top dressing. Four irrigation were given in maize. Maize potato and maize rajmash received 3 irrigation. Remaining 2 irrigation given in maize after harvests of intercrops. The different parameter were studied such as:-Plant height, Leaf area index, dry matter accumulation, no. of grain/cob, test wt, grain yield, harvest index.

RESULTS AND DISCUSSION

Maximum plant height occurred in T_8 (Maize + 1 row Radish) and minimum in T_3 (Maize +2 row Rajmash.) .T_8 is taller, physically resources of growth might have affected the growth of maize plant under intercropping system (Bose and Thakur1980 and Prasad 1986). More number of leaves occurred in T_1(maize sole) and among intercrops due to higher quantum of sunlight available to the upper leaves making them physiologically more active. More Leaf area index reaches in T_8 due to lower plant population of intercrop per unit area in intercropping and less competition for physical resources (Prasad, 1986). Lai (1985) revealed that intercropping increased the leaf area index and efficiency of light use due to multi-storey spatial effect. Maximum dry matter accumulation occurred in T_1 and among intercrops T_8 and minimum in T_3 and T_7. Maximum dry matter accumulation occurred in T_1 (Maize sole) due to relatively higher value of LAI in more accumulation of photosynthesis and consequently the production of higher quantum of total dry matter but after harvest of raddish, potato, fababean, pea and rajmash, the magnitude of depression was reduced as the competition was almost less in maize intercropping system after harvest of intercrops maize could utilize sunlight, moisture and residual nutrients without any competition. Grain yield was found more in T_1 (maize sole) and among intercrops T_8 and minimum in T_7 (Jha *et al.*(1999) revealed that highest yield attributes of winter maize was found superior under sole cropping than maize+ potato. Intercropping of winter maize with potato was most productive interms of maize and potato yield and recordrd the highest mean monetary advantage index(1.46) and high benefit cost ratio. (Tyagi *et al.*(1984)

In sole maize grain yield(Table No.1) more because of plant stand more, no competition for moisture ,temperature, nutrient and more in leaf area index. Grain yield reduction found in two rows of treatments as compared to one row treatments due to exhaustive vegetative growth and poor computability with maize due to higher population causing intercompetition, growth of two rows intercrops was fast in early stage, biomass higher which depleted more nutrient and water as compared to one row of intercrops. Compatibility of reddish with winter maize was also reported by Meenakshi *et al.*(1974) and Pandey *et al.*(1981) Among intercrops (T_8-maize + 1 row radish) secured highest plant height, No. of leave/plant, LAI at harvest ,Dry matter accumulation better yield attributes such as no. of grain/cob, test wt and grain yield ,harvest index than other treatment(when intercropped with potato ,rajmash ,pea and fababean) *mainly due to* higher availability of nutrient, participation of higher photosynthetic activity, higher leaf area index leads to more no of grain, thousand grain wt. and ultimately more yield. Similar trend was observed in harvest index.

CONCLUSION

Sole maize recorded maximum at all the parameter viz., plant height No. of leaves, lai, no. yield attributes, grain yield and harvest index. Among intercrops Maize intercrops with T_8-maize + 1 row radish produced higher plant height, No. of leaves, LAI, No. yield attributes, grain yield and harvest index.

To achieve higher yield maize may be grown as INTERCROP Maize + 1 row Radish.

REFERENCES

[1]. Bose,P.K. and Thakur,K.(1980). "A study of cropping pattern of sugarcane and wheat for efficient use of land and resource. *Indian Sug.* **29***(12):* 771-775

[2]. Jha,G.,Singh, D.P. and Thakur, R.B.(1999). Comparative performance of winter maize based intercroppping system under various nutrient levels in calcarious belt of North bihar, *RAU J.Res*.**9**(1):45-49.

[3]. Lai,Z.M.(1985) studied on intercropping advantages of potato maize and maize –soyabean cropping systems. *Acta Agronomica Sinicia* **11**(3):163-172.

[4]. Meenakshi,K,;Fazlullh khan A.K. and Appuduari R.(1974). Studies on intercropping on short duration vegetables with maize, *Madras Agric.J.***61***(8):* 398-401

[5]. Pandey,J., Singh,D.P., Prasad.S.D. and Sharma,N.N.(1981). Intercropping under rainfed condition in north bihar. *Indian farming*.**31**(1):17-18.

[6]. Prasad,T.N.(1986).Effect of irrigation and pattern of sowing on different intercrops with winter maize. *Ph.D thesis, RAU* Bihar.

[7]. Prasad,U.K. and Prasad,T.N.(1988).Studies on production potential of intercrops with winter maize, *Indian Farming*.**38***(7):* 9-10

[8]. Sharma,V.M,:Chakur,I.S.and Manchanda A.K. (1998). Effect of maize based legume intercroppinon growth and yield attributes of succeeding wheat and economics, *Indian J. Agron.* **43***(2):* 231-236.s

[9]. Singh, R.N.P.(1991).Studies on intercropping in rajmash during winter season. M.Sc.(Ag.) Thesis, RAU, Bihar, Pusa (Samastipur).

[10]. Tyagi,R.C., NandaL, D.P., S., Hooda, T.S. and Faroda,A.S.(1994). Performance of winter maize(zea mays) based intercroppping system under irrrigated condition in haryana. *Indian J. Agron*.**39**(2);207-210.

TABLE NO. 1

Treatments	Plant height at harvest (cm)	LAI at harvest	Dry matter accumulation (g/plant) at harvest	No. of grain/cob	Test wt (1000)grain wt.(g)	Grain yield (q/ha)	Harvest Index (%)
T1-Maize sole	152.36	2.91	164.75	360.02	325.65	50.25	38.57
T2-Maize +1 row Rajmash	141.80	2.62	147.01	319.37	315.47	40.75	36.64
T3-Maize +2 row Rajmash	136.68	2.54	135.42	314.10	310.43	39.90	36.25
T4-Maize + 1 rowPotato	143.56	2.65	149.10	339.09	316.50	41.30	37.84
T5-Maize + 2 rowPotato	141.40	2.51	138.35	335.50	323.07	39.00	37.46
T6-Maize + 1 row Pea	141.20	2.76	140.55	336.60	315.00	39.60	37.11
T7-Maize + 2 row Pea	137.64	2.49	135.42	316.80	307.88	35.20	36.90
T8-Maize + 1 row Radish	150.00	2.86	158.20	348.93	324.40	44.70	38.14
T9-Maize + 2 row Radish	140.44	2.71	138.39	335.9	318.99	39.20	38.05
T10-Maize 1row Fababean	148.76	2.80	152.96	340.02	32.25	41.80	37.15
T11-Maize 2row Fababean	144.60	2.78	144.01	346.94	320.50	40.50	37.13
S.Em(±)	7.86	0.09	3.84	15.40	13.61	2.53	1.35
CD at 5%	NS	0.27	12.53	NS	NS	7.46	NS

TABLE NO. 2

Details of crop variety used, seed rate.

Crops	Variety	**Seed rate**
Maize	Deoki	20
Rajmash	PDR-14	100
Potato	Jawahar 25	
Pea	Azad	80
Radish	Japanese white	7

