Amrendra Kumar, International Journal of Advances in Agricultural Science and Technology,
Vol.1 Issue. 1, December- 2013, pg. 96-99 ISSN: 2348-1358

Response of Rabi Maize and Intercrops on Yield and Economics 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 with 1 row radish showed highest yield than when intercropped with potato, rajmash, pea and fababean. Where as in intercrops highest yield was found under maize+ 2 row radish. Maize intercropped with 2 rows of potato produced higher maize yield equivalent (113.32 q/ha). In terms of net income the highest net return was earned under maize + 2 rows of rajmash (Rs 31005.99/ha). However, it was statistically at par with maize + 1 row rajmash (Rs.27941.1/ha), maize + 1 rows of potato (Rs 2728.16/ha) and maize + 2 rows of potato (Rs.27216.45/ha). Net return per rupees of investment obtained ranked in the order of maize + 1 rows rajmash (Rs 1.88) > maize + 2 rows of rajmash (Rs 1.71) > maize + 1 row of potato (1.26). Minimum net return per rupees of investment (0.86) was associated with 2 rows of potato intercropped in between 2 rows of maize. Therefore, on the basis of field experimental results, it may be concluded that maize may be intercropped with potato and rajmash in 1:2 ratio for higher productivity.***

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. Singh (1991) has reported the possibility of intercropping Rabi maize with Rajmsh with distinct advantage**.** 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.

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. Crops Cultivar (Table . 2.) 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 waside 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:-,grain yield, yield of intercrops, Equivalent yield. Gross return, Net return and Net return rupees per investment. The economics of different crop and crop combination were computed on the basis of prevailing market price. Maize yield equivalence was calculated based on the prevailing price of the

intercrops and the quantity of maize grain that could be purchased from the income of intercrops. Thus ,the intercrop yield was applied in the furrow opened just by the converted into maize equivalent yield under different treatments using the following formulas and added to the maize yield to get total maize equivalent yield YME= YI×PI/Pm

Where YI-yield of intercrop

PI–price of intercrop Pm-price of maize.

Cost of cultivation incurred under different cropping system was estimated by adding all costs incurred on cultivation with interest on working capital. Gross income calculated through total income by selling the produce was estimated and the gross income was calculated in rupees per hectare. Net income was obtained by subtracting the cost of cultivation from gross income and Net return per rupees of investment was calculated Net return (Rs/ha) upon cost of cultivation (Rs/ha).

Results and Discussion

Grain yield was found more in T_1 (maize sole) and among intercrops T_8 and minimum in T_7. In sole maize grain yield 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.suitibility of reddish with winter maize was also reported by Meenakshi *et al.* (1974) and Pandey *et al.*(1981)among intercrops higher yield was found under (T_9) Maize + 2 row Radish**.** Maize equivalent yield was found maximum in T_5 treatments due to better utilization of resources, suppression of weeds, evaporation losses of moisture and higher nutrient availability than sole stand (T_1), (Sharma *et al. (*1998). 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).

Gross return (Table. 1.) was maximum in T_5 due to the variation in plant stand and the yield. Net income maximum (Table. 1.) in T_3 is due to the variation in plant stand and yield of intercrops and Net return per rupees (Benefit cost ratio) observed more in T_2 due to lower cost of cultivation of rajmash to other intercrops.

Conclusion

Maize intercrops with 2 rows of potato produced higher maize yield equivalent (113.32).In terms of Net income the highest Net return was obtained under maize+ 2 rows of rajmash (Rs.31005.99/ha).However benefit cost ratio was recorded highest under maize+ 1 rows of rajmash .It may be concluded that maize may be intercropped with potato and Rajmash in 1:2 ratio for higher productivity.

References

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

[2]. 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

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

[4]. 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.

[5]. 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

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

[7]. 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. 1.

Treatments	Grain yield (q/ha) Maize	Yield of Intercrops(q/ha)	Equivalent yield(q/ha) (q/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio
T1-Maize sole	50.25		50.20	27743.30	16196.96	1.40
T2-Maize +1 row Rajmash	40.75	11.18	80.95	42779.60	16196.96	1.88
T3-Maize +2 row Rajmash	39.90	15.56	93.92	49136.64	31005.99	1.77
T4-Maize + 1 rowPotato	41.30	129.83	93.23	48852.60	27287.16	1.26
T5-Maize + 2 rowPotato	39.00	185.79	113.32	58801.00	27216.45	0.86
T6-Maize + 1 row Pea	39.60	9.09	66.89	35650.70	21512.88	1.52
T7-Maize + 2 row Pea	35.20	11.04	68.32	36128.40	19399.09	1.15
T8-Maize + 1 row Radish	44.70	144.60	73.60	39192.40	25384.96	1.83
T9-Maize + 2 row Radish	39.20	190.01	77.20	40706.80	24638.26	1.53
T10-Maize 1row Fababean	41.80	8.35	58.90	31778.40	17581.58	1.23
T11-Maize 2row Fababean	40.50	10.30	61.20	32861.61	16014.29	0.95
S.Em(±)	2.53		2.77	1371.90	1371.92	0.08
CD at 5%	7.46		8.18	4047.07	4047.20	0.23

Table. 2.

Crops	Variety	Seed rate (Kg/ha)
Maize	Deoki	20
Rajmash	PDR-14	100
Potato	Jawahar 25	
Pea	Azad	80
Radish	Japanese white	7

