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Performance and economics of sweet corn as influenced by leafy vegetables intercropping system under rainfed condition

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ABSTRACT : The present investigation was undertaken during *Kharif* 2009-10 at the Farm of Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The objective of this study was to study the effect of different vegetables intercrops on growth, yield and economics of sweet corn and vegetable intercropping systems. The experiment was laid out in Randomized Block Design with four replications and six treatments. These six treatments comprised of sweet corn as a base crop and fenugreek, spinach, coriander, garlic and shepu as intercrops. Sole sweet corn was sown at uniform spacing at 90 × 20 cm. In intercropping treatments treatment sweet corn + fenugreek, sweet corn + spinach, sweet corn + coriander, sweet corn + garlic and sweet corn + shepu were sown at uniform spacing in 15 cm between two rows. The investigation was planned with specified objectives as to study the effect of various vegetable intercrops on growth, yield and productivity of sweet corn under rainfed condition. The sole sweet corn and sweet corn + shepu significantly increased the plant height, functional leaves, leaf area and total dry matter per plant as well as yield contributing characters *viz.*, length of cob and no. of grains per cob over other vegetables intercropping treatments. The grain and fodder yield was also increased with sole sweet corn and sweet corn + shepu over the other treatments. The cob yield, no. of cobs per hectare also recorded higher with sole sweet corn. The GMR, NMR and B : C ratio intercropping system were found higher in sweet corn + coriander and sweet corn + spinach.

Key **W**ords : Sweet corn, Intercropping system, Growth, Yield, Economics

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Sweet corn is one of the most popular types for human consumption among different types of corn grown. It is peculiarly an American crop. Origin of sweet corn is considered as Peru, Bolivia and Equador. Sweet corn has been bred to have higher levels of natural sugar, which makes it very popular. It is hybridized maize, specially bred to increase sugar content and also known as "sugar corn".

Vegetable as a intercrop provides leafy vegetable under rainfed situation within short duration which gives more monetary returns than any other short duration agronomical crop as demand of vegetables during the rainy season is more. Fenugreek commonly known as methi is cultivated throughout India which is used for cooking, salad and fodder purpose. Spinach is one of the most common vegetables of tropical and subtropical region and is grown widely in India. Leaves are rich in vitamin A, C, calcium, etc. coriander is used as common flavouring substance. Its leaves are used for flavouring curries, sauces and soups. Garlic leaves are rich in proteins, phosphorus, potassium, calcium, magnesium, carbohydrates and used for cooking purpose. Shepu leaves are easily available in most part of India throughout the year and are added to favour many recipes.

Intercropping is a type of mixed cropping and defined the agricultural practice of cultivating two or more crops in the same space at the same time (Andrew and Kassam, 1976). Intercropping is much more scientific, rational and refined concept than traditional practice of mixed cropping. Although intercropping is not now new concept it has attracted

worldwide attention due to its various advantages. It was originally practiced as an insurance against crop failure under rainfed conditions. Risk may be minimized in intercropping (Woolley and Davis, 1991). Biological efficiency of intercropping due to exploration of large soil mass compared to monocropping (Francis, 1989). This advanced agro-technique has been practiced in past decades and achieved the goal of agriculture. There are some socio-economic (Ofori and Stern, 1987), biological and ecological advantages (Aggarwal *et al.*, 1992; Fininsa, 1996) in intercroping over monocropping. Several scientists has been worked with intercropping (Mandal *et al.*, 1990; Natarajan, 1992; Kalarani, 1995; Aravazhi *et al*., 1997; Balan, 1998; Sadashiv, 2004; Yildirim and Guvenc, 2005; John and Mini, 2005; Suresha *et al*., 2007; Seran and Jeyakumaran, 2009; Brintha and Seran, 2009). At present its main objective is higher productivity per unit area in addition to stability in production in rainfed situation where uncertainly and ill distribution of rainfall, monocropping becomes risky. Preliminary studies show that intercropping system are used for additional yield increment of corn in rainfed areas of Maharashtra. By considering the detail study, present investigation was planned with objectives as to study the effect of different vegetables intercrops on growth, yield and economics of sweet corn and vegetable intercropping systems.

RESEARCH PROCEDURE

Akola is situated in the subtropical region at 22^0 42' N latitude and 77^0 02' E longitudes and at an attitude of 307.42 m above mean sea level. The climate of Akola is semis arid and characterized by three distinct seasons *viz.*, hot and dry summer from March to May, warm and rainy mansoon from June to October and mild cold winter from November to February. Average annual precipitation was 818.6 mm. The mean daily evaporation reaches as high as 16.8 mm in the month of May and as low as 4.3 mm in the month of August.

The present experiment was conducted at the Block No. 66 of Agronomy Farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The present investigation was conducted in Randomized Block Design with six treatments *viz.*, T_1– Sole sweet corn, T_2– Sweet corn + fenugreek, T_3– Sweet corn + spinach, T_4– Sweet corn + coriander, T_5– Sweet corn + garlic and T_6– Sweet corn + shepu and four replications. The topography of the experimental plot was fairly uniform and levelled with 2 per cent grade. Soil of the experimental site was clayey in texture, slightly alkaline in nature having moderate organic carbon content, low available nitrogen, low available phosphorus and high available potassium.

RESEARCH ANALYSIS AND REASONING

The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads :

Growth attributes :

Data pertaining to growth of sweet corn as influenced by different intercrop presented in Table 1 indicated the significant effect on sweet corn. It revealed that treatments had no significant influence on the emergence count and final plant stand of corn indicating thereby uniform emergence and persistence throughout the crop growth period. Sole sweet corn recorded significantly maximum plant height (178.36 cm), no. of functional leaves (23.57) and leaf area per plant (77.85) over sweet corn + spinach and it was at par with sweet corn + fenugreek, sweet corn + coriander, sweet corn + garlic and sweet corn + shepu. This indicated that adequate space available due to these treatments to the crop during the growth period which ultimately enhanced plant height,and due to the increased in plant height that ultimately resulted in increase of nodes and internode with increase in no. of functional leaves and leaf area per plant. Similar types of results were reported by Jha *et al.* (2000) and Das *et al.* (2002).

Post harvest studies :

Data pertaining to post harvest studies of sweet corn as influenced by different intercrop presented in Table 2 indicated the significant effect on sweet corn. It revealed that days to 50 per cent tasseling and silking and no. of cobs plant^{-1} were not significantly influenced due to different treatments. Length of cob, girth of cob, no. of grains cob^{-1} and test weight as influenced by different treatment, sole sweet corn (T_1) significantly increased the length of cob (21.95 cm), girth of cob (9.56 cm), no. of grains cob^{-1} (567.75) and test weight (129.70 g) and was at par with T_2, T_3, T_4, T_5 and T_6.

Yield attributes :

Data pertaining to green cob yield, no. of cob ha^{-1}, dried grain and fodder yield as influenced by different intercrops are presented in Table 3. It indicated that treatment T_1 *i.e.* sole sweet corn recorded significantly higher green cob yield (356.27 q ha^{-1}), no. of cobs ha^{-1} (85644.932), grain yield (96.61 qha^{-1}), fodder yield (250.59 qha^{-1}) and biological yield (403.86 qha^{-1}) over treatments sweet corn + spinach but it was at par with T_2, T_4, T_5 and T_6. Harvest index and grain to fodder ratio were not significantly due to different intercrops. The sole sweet corn recorded significantly higher green cob yield, dried grain yield and fodder yield than any intercropping treatments. The yield reduction in intercropping treatment was due to competition for nutrient, moisture, space, etc. These results are in agreement with those reported by Memon and Mallik (1980), Kulkarni (1995), Krishnaswamy *et al*. (1995), Das *et al.* (2002) as they found reduction in yield of base crop due to intercrop competition.

Table 1 : Growth of sweet corn as influenced by different intercrop

Treatments	Emergence count	Final plant stand	Plant height (cm)	No. of functional leaves/plant	Leaf area/plant
T_1-Sole sweet corn	145.25	141.00	178.36	23.57	77.85
T_2- Sweet corn +fenugreek	145.00	140.25	172.62	21.47	75.99
T_3- Sweet corn + spinach	144.25	140.50	160.30	16.87	65.11
T_4- Sweet corn + coriander	145.25	140.25	174.05	18.89	74.30
T_5- Sweet corn + garlic	145.75	140.25	175.55	21.52	72.57
T_6- Sweet corn + shepu	145.75	140.25	176.8	21.32	75.52
S.E. $\pm$	0.39	0.29	3.65	0.37	2.59
C.D. (P=0.05)	NS	NS	10.99	1.12	7.80

NS=Non–significant

Table 2 : Post harvest studies of sweet corn as influenced by different intercrop

Treatments	Days to 50% tasseling and silking	Length of cob (cm)	Girth of cob (cm)	No. of grains/ cob	Test wt. (g)	No. of cobs/plant
T_1-Sole sweet corn	38.75	21.95	9.56	567.75	129.70	1
T_2- Sweet corn +fenugreek	40.75	20.34	8.37	528.12	115.37	1
T_3- Sweet corn + spinach	40.50	16.48	7.76	523.30	109.80	1
T_4- Sweet corn + coriander	40.00	19.38	9.08	550.70	117.67	1
T_5- Sweet corn + garlic	39.75	20.51	9.12	551.77	120.6	1
T_6- Sweet corn + shepu	39.25	21.75	9.22	560.22	128.66	1
S.E. $\pm$	0.99	1.16	0.37	7.73	4.25	0
C.D. (P=0.05)	NS	3.50	1.13	23.30	12.82	NS

NS = Non-significant

Table 3 : Yield parameters of sweet corn as influenced by different intercrop

Treatments	Green cob yield (qha^{-1})	No. of cobs ha^{-1}	Dried grain yield (qha^{-1})	Fodder yield (qha^{-1})	Biological yield (qha^{-1})	Harvest index (%)	Grain to fodder ratio
T_1-Sole sweet corn	356.27	85644.932	96.61	250.59	403.86	23.93	0.38
T_2- Sweet corn +fenugreek	353.67	85644.25	93.26	245.60	391.98	23.81	0.37
T_3- Sweet corn + spinach	252.10	79262.07	58.87	158.51	245.92	24.02	0.37
T_4- Sweet corn + coriander	354.81	85644.40	96.05	250.15	401.27	23.93	0.38
T_5- Sweet corn + garlic	355.25	85644.71	96.11	250.28	401.55	23.97	0.38
T_6- Sweet corn + shepu	355.67	85644.79	96.25	250.39	402.03	23.92	0.38
S.E. $\pm$	16.86	841.57	4.31	9.89	15.84	1.69	0.019
C.D. (P+0.05)	50.81	2535.87	13.00	29.82	47.74	NS	NS

NS = Non–significant

Table 4 : Economics of sweet corn as influenced by different intercrop

Treatments	GMR (Rs. ha^{-1})	NMR (Rs. ha^{-1})	B:C
T_1-Sole sweet corn	98857.45	56622.30	2.37
T_2- Sweet corn + fenugreek	217915.30	152335.73	3.91
T_3- Sweet corn + spinach	422629.11	356908.61	6.43
T_4- Sweet corn + coriander	483687.47	419973.10	6.83
T_5- Sweet corn + garlic	149949.63	74827.75	2.29
T_6- Sweet corn + shepu	294024.93	286469.12	4.49
S.E. $\pm$	9750.20	29094.76	-
C.D. (P=0.05)	29379.64	87669.33	-

Economics :

Data regarding the gross returns, net monitory returns and benefit cost ratio are presented in Table 4. Data indicated that highest gross monitory returns (Rs. 483687.47 ha^{-1}), net monitory returns (Rs. 419973.10 ha^{-1}) and benefit cost ratio (6.83) were observed with treatment sweet corn + coriander (T_4) followed by sweet corn + spinach (T_3).

Conclusion :

From the study, it is concluded that the growth and yield attributes were significantly higher with treatment sole sweet corn (T_1) than other all intercropping treatments while among intercropping treatments sweet corn + coriander recorded highest GMR, NMR and B:C ratio followed by treatments sweet corn + spinach than sole sweet corn.

LITERATURE CITED

Aggarwal, P.K., Garrity, D.P., Liboon, S.P. and Morris, R.A. (1992). Resource use and plant interactions in a rice mungbean intercrop. *Agron. J.*, **84** (1) : 71-78.

Andrew, D.J. and Kassam, A.H. (1976). The importance of multiple cropping in increasing world food supplies. In: Multiple cropping, papendick, R.I., Sanchez, A. and Triplett, G.B. (Eds.) American Society Agronomy, Madison, WI, U.S.A.

Aravazhi, E., Natarajan, S. and Thambaraj, S. (1997). Economics of intercropping in chilli. *South Indian Hort.*, **45**: 139-194.

Balan, B. (1998). Productivity of ashgourd as influenced by crop combinations. M.Sc. Thesis, Kerala Agricultural University, Thrissur, KERALA (INDIA).

Brintha, I. and Seran, T.H. (2009). Effect of paired row planting of radish (*Raphonus sativus* L.) intercropped with vegetable amaranths (*Amaranths tricolor* L.) on yield componets of radish in sandy regosol. *J. Agric. Sci.*, **4** (1) : 19-28.

Das, Anup, Gnanamurthy, A.P. and Kumar, Narendra (2002). Effect of vegetable intercropping and source of nutrient on yield attributing character and yield of pigeonpea. *Indian J. Agron.*, **47** (3): 340-344.

Fininsa, C. (1996). Effect of bean and maize intercropping on bean common bacterial blight and rust diseases. *Internat. J. Pest Mgmt.*, **42** (1) :51-54.

Francis, C.A. (1989). Biological efficiency in multiple cropping systems. *Adv. Agro.*, **42**: 1-42.

Jha, G., Singh, D.P. and Thakre, R.B. (2000). Production potential of maize (*Zea mays*) + potato (*Solanum tuberosum*) intercropping as influenced by fertilizer and potato genotype. *Indian J. Agron.*, **45** (1): 59-63.

John, S.A. and Mini, C. (2005). Biological efficiency of intercropping in okra [*Abelmoschus esculentus* (L.)]. *J. Trop, Agric.*, **43**: 33-36.

Kalarani, S. (1995). Competitive and complementary effects of bhindi and cowpea intercropping system in summer rice fallows. M.Sc. Thesis, Kerala Agricultural University, Thrissur, KERALA (INDIA).

Krishnaswamy, S.A., Ali, Mohamed and Manoharan, S. (1995). Productivity and profitability of intercropping in summer cotton and its nitrogen management. *Madras Agric. J.*, **82** (11): 584-587.

Kulkarni, R.V. (1995). Studies on intercropping in cotton. M.Sc. Thesis. Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).

Mandal, B.K., Dhara, M.C., Mandal, B.B., Mandal, Das, S.K. and Nandy, R. (1990). Rice mungbean, soybean, peanut, ricebean and blackgram yields under different intercropping systems. *Agron. J.*, **82** (6) : 1063-1066.

Memom, A.M. and Malik, M.N. (1980). Effects of mixed cropping on seed cotton yield and other economic character of Pakistan upland cotton. *Pakistan J. Sci.*, **32** (1-2): 95-98.

Natarajan, S. (1992). Effect of intercrops on chilli (*Capsicum annuum* L.) under semi dry conditions. *South Indian Hort.*, **40**: 273-276.

Ofori, F. and Stern, W.R. (1987). Cereal legume intercropping systems. *Adv. Agron.*, **41**: 41-90.

Sadashiv, B.N. (2004). Production potential of hybrid cotton (Gossypium hirsutum) based vegetable intercropping systems under irrigation. M.Sc.Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Seran, T.H. and Jeyakumaran, J. (2009). Effect of planting geometry on yield of capsicum (*Capsicum annum* L.) intercropping with vegetable cowpea (*Vigna unguiculata* L.). *J. Sci.*, **6**: 11-19.

Suresha, B.A., Allolli, T.B., Patil, M.G., Desai, B.K. and Hussain, S.A. (2007). Yield and economics of chilli based intercropping system. *Karnataka J. Agric. Sci.*, **20**: 807-809.

Woolley, J. and Davis, J.H.C. (1991). The agronomy of intercropping with beans. In: Common beans: Research for crop inprovement, van schoonhoven, A. and Voyeset, O. (Eds.).CAB International in Association with CIAT, Wallingford, 707-735 pp.

Yildirim, E. and Guvenc, I. (2005). Intercropping based on cauliflower: more productive, profitable and highly sustainable. *Eur. J. Agron.*, **22** (1) : 11-18.