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Intercropping of different leafy vegetables in *Rabi* sweet corn (*Zea mays saccharata* L.)

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Abstract
The experiment was conducted at Zonal Agricultural Research Station, Ganeshkhind, Pune during the *rabi* seasons of 2020, 2021 and 2022 to evaluate the performance of intercropping of leafy vegetables in sweet corn. The experiment comprised of seven treatments *viz*., Sweet corn + Fenugreek (1:4) Sweet corn + Spinach (1:4) Sweet corn + Coriander (1:4) Sweet corn +Safflower (1:4) Sweet corn + Dill (1:4) Sweet corn + Amaranthus (1:4) Sole Sweet corn with three replications. Results revealed that significantly higher cob yield and green fodder yield (16.92 t ha^{-1} and 25.82 t ha^{-1}, respectively) was recorded in Sole Sweet corn followed by intercropping of Sweet corn + Fenugreek (1:4), Sweet corn + Dill (1:4) and Sweet corn + Coriender (1:4) during three years pooled results. Higher intercrop yield (21.93 t ha^{-1}) was recorded by Safflower in Sweet corn + Safflower (1:4) intercropping system followed by Spinach in Sweet corn + Spinach (1:4) intercropping. Significantly higher Sweet corn Equivalent Yield (25.30 t ha^{-1}) was recorded in Sweet corn + Safflower (1:4) intercropping in pooled results which was found at par with intercropping of Sweet corn + Spinach (1:4) (T_2), Sweet and Sweet corn + Fenugreek (1:4). In pooled results significantly higher system net returns (Rs. 390247/-) was recorded in Sweet corn + Fenugreek (1:4) which was found at par with Sweet corn + Spinach (1:4), Sweet corn + Dill (1:4) and Sweet corn +Safflower (1:4). While intercropping of Sweet corn +Spinach (1:4) recorded higher B: C ratio (4.14) followed by Sweet corn + Dill (1:4) and Sweet corn +Safflower (1:4).

Keywords: Intercropping, sweet corn, vegetables, sweet corn equivalent yield

1. Introduction
Maize (*Zea mays*) is considered one of the most important cereal crops of the world and referred as “Queen of cereals” It has a great role in food security in most of the developing countries in the world. In India, maize rank third in cereals after rice and wheat.
Maize is widely consumed as food in various forms. It is also used as animal food, particularly for poultry. Green maize plants are used as succulent fodder. Popping the corn is a method of starch cookery. Maize is a raw material for a number of products *viz*., starch, glucose, dextrose, sorbitol, dextrine, high fructose syrup, maltodextrine, germ oil, germ meal, fiber and gluten products which have application in industries such as alcohol, textile, paper, pharmaceuticals, organic chemicals, cosmetics and edible oil.
Sweet corn (*Zea mays saccharata* L.) also known as sugar corn and pole corn is genetic variation of maize for increase in more sugar and less starch content in cob. It is consumed as vegetable form as balanced diet constituent. It is grown primarily as a food and is harvested with about 70% moisture before hardening and drying of the grain starts. Sweet corn is a good source of energy. About 20% of the dry matter is sugar, compared with only 3% in dent maize at green ear stage. It is also a good source of vitamin C and A. It has a fast growing habit with short duration maturity. Therefore, it is being included in intensive vegetable cropping system in India.
Leafy vegetables has a nutritional values which constitute vitamins, minerals, carbohydrates and low in fats and calories which are necessary and important for good human health. It also have medicinal value traditional literature. Plenty of phytochemicals present in leafy vegetables act as a defense mechanism in human body. Many leafy vegetables stimulate appetite because it contain essential oils, glycosides and pigments. Leafy vegetables constitute soluble and

insoluble fibers which helps in digestion. Leafy vegetables have number of mineral like Ca, Mg, P, Fe, Cu *etc*.which provide alkalizing effect and neutralize acidity produced by other foods.

Intercropping is growing two or more crops simultaneously on the same piece of land with a definite row pattern. Intercropping was originally practiced as an insurance against crop failure under rainfed conditions. At present, in irrigated system the main objective of intercropping is higher productivity per unit area in addition to stability in production. Intercropping system utilizes resources efficiently and their productivity increased. It also help to maintain soil fertility as the nutrients from rhizoshere are utilized by both the component crops from different soil layers.

Vegetables are more remunerative as intercrop than any other short duration agronomical crop. Most of the leafy vegetables such as fenugreek, spinach, dill, coriander, safflower and amaranthus can be included as intercrop with different component crops. Leafy vegetables are grown as a short duration crops which may suit as intercrops in crop like sweet corn. They have different growing habit and nutritional requirement and growing period than sweet corn.

Palak coriander and amaranthus also the best option for intercropping purpose [Chaudhari *et. al* 2018] [2]. Therefore, it is necessary to determine an appropriate intercrop vegetables in sweet corn.

2. Materials and Methods

The experiment was conducted at Zonal Agricultural Research Station (ZARS), Ganeshkhind, Pune during the *rabi* seasons of 2020, 2021 and 2022. According to NARP, ZARS comes under the Western Maharashtra Plain Zone. Geographically it is situated on $18^0 22`$ N latitude and $73^0$ 51`E longitudes having an altitude of 557.74 m above mean sea level. The topography of the experiment plot was uniform. The suitable experimental site was selected for raising of sweet corn and different intercrops. The field experiment was arranged in Randomized block design consist of seven treatments *viz*., T_1: Sweet corn + Fenugreek (1:4), T_2: Sweet corn + Spinach (1:4), T_3: Sweet corn + Coriander (1:4), T_4: Sweet corn +Safflower (1:4), T_5: Sweet corn + Dill (1:4), T_6: Sweet corn + Amaranthus (1:4) and T_7: Sole Sweet corn with three replications. The experimental sites soil was medium black in colour and well drained, with a uniform depth of up to 90 cm. The soil of the experimental field was clay loam in texture with slightly alkaline in reaction. The soil was low in available nitrogen, moderately high in available phosphorous and high in available potassium as well as very low in organic carbon content. The Gross and plot size was 4.50 x 4.00 m² and 3.00 x 3.00 m², respectively. Sweet corn crop was sown at 75 cm x 20 cm and leafy vegetables were sown at 10 cm row distance from the center between two rows of sweet corn. The varieties for Sweet Corn: Phule Madhu, Fenugreek: Phule Kasturi and for Spinach Coriander, Safflower, Dill and Amaranthus Local varieties were used. The leafy vegetables were harvested at 30 to 35 days after sowing. The recorded data were analyzed following statistical program (Gomez and Gomez, 1984). Sweet Corn equivalent yield (SEY) and BCR were calculated to ascertain the effectiveness of intercropping. Sweet Corn equivalent yield was estimated by converting the yield of intercrops to the yield of Sweet Corn on the basis of prevailing market prices of individual crops. Gross and net monetary return with B:C ratio was calculated to assess the intercropping system.

Sweet Corn Equivalent Yield was calculated as per Bandyopadhyay (1984) [1]:

$$\text{Sweet Corn Equivalent Yield (MEY)} = \frac{\text{Yield of Intercrop (t ha}^{-1}\text{) x Price of Intercrop (Rs. t}^{-1}\text{)}}{\text{Price of Sweet Corn (Rs.t}^{-1}\text{)}}$$

Results and Discussion

Effect of sweet corn based intercropping on Sweet corn: Growth parameters

The data presented in Table. 1 revealed that the plant height of sweet corn was significantly affected due to different intercropping system at 30 DAS, 60 DAS and at harvest during all the years of experimentation and in pooled data.

At 30 and 60 DAS significantly higher plant height (82.45 and 152.08 cm, respectively) was recorded in Sole Sweet corn (T_7) which was followed by Sweet corn + Fenugreek (1:4) (T_1**)** and Sweet corn + Amaranthus (1:4) **(**T_6**)** in pooled mean. At harvest, significantly higher plant height (154.04 cm) was observed in Sole Sweet corn (T_7) which was followed by Sweet corn + Fenugreek (1:4) and (T_1**)** Sweet corn + Dill (1:4) (T_5) during 2020.

At 30 and 60 DAS and at harvest significantly higher number of leaves (6.82, 11.62 and 9.64 respectively) were recorded in Sole Sweet corn (T_7) pooled analysis and it was found at par with Sweet corn + safflower (1:4) (T_4) at 30 DAS, with Sweet corn + Fenugreek (1:4) (T_1) and Sweet corn + Amaranthus (1:4) (T_6) at 60 DAS and with Sweet corn + Fenugreek (1:4) (T_1), Sweet corn + Coriander (1:4) (T_3) and Sweet corn + Dill (1:4) **(**T_5) at harvest. (Table 1)

Significantly higher length of cob (31.20 cm) was found in Sole Sweet corn (T_7) which was found at par with Sweet corn + Fenugreek (1:4) (T_1). Significantly higher cob girth (23.20 cm) was recorded in Sole Sweet corn (T_7) which was found at par with Sweet corn + Fenugreek (1:4) (T_1) and Sweet corn + Coriander (1:4) (T_3). Sweet corn grain rows were not affected significantly due to intercropping of leafy vegetables in sweet corn.

This showed that suitable space available due to these intercropping treatments to the sweet corn during the growth period which ultimately improved plant height, number of leaves, length of cob and cob girth. Similar types of findings were reported by Jha *et al.* (2000) [4], Das *et al.* (2002) [3] and Vilhekar *et al.* (2014) [8].

Yield and yield parameters

The data reported in Table. 2 revealed that significantly higher average weight of cob with husk and without husk (368 and 241 g) was observed in Sole Sweet corn (T_7) in pooled results which was followed by Sweet corn + Fenugreek (1:4) (T_1), Sweet corn + Amaranthus (1:4) (T_6) and Sweet corn + Dill (1:4) (T_5) with respect to average weight of cob with husk while, T_7 was found at par with Sweet corn + Fenugreek (1:4) (T_1) respect to average weight of cob without husk.

Significantly higher cob yield (16.92 and t ha^{-1}) was recorded in Sole Sweet corn (T_7) during all the three years and in pooled results which was followed by intercropping of Sweet corn + Fenugreek (1:4) (T_1), Sweet corn + Dill (1:4) (T_5) and Sweet corn + Coriander (1:4) (T_3). While significantly higher green fodder yield (25.82 t ha^{-1}) of sweet corn was recorded in Sole Sweet corn (T_7) in pooled results which was found at par with intercropping of Sweet corn + Fenugreek (1:4) (T_1).

Intercropping of Sweet corn + Dill (1:4) (T_5) registered the

highest harvest index (39.91%) followed by Sole Sweet corn (T_7) (39.61%).

The sole sweet corn recorded considerably higher green cob yield and fodder yield than any intercropping treatments. The yield reduction in intercropping treatment was might be due to competition for nutrient, moisture, space, etc. These results are in conformity with those reported by Kulkarni (1995) [6], Krishnaswamy *et al.* (1995) [5]. They found reduction in yield of base crop due to intercrop competition.

Intercrop yield and Sweet corn Equivalent Yield

Higher intercrop yield (23.13 t ha^{-1}) was recorded by Safflower in Sweet corn + Safflower (1:4) intercropping system followed by Spinach (22.88 t ha^{-1}) in Sweet corn + Spinach (1:4) intercropping. Significantly higher Sweet corn Equivalent Yield (25.30 t ha^{-1}) was recorded in Sweet corn + Safflower (1:4) intercropping (T_4) pooled results which was found at par with intercropping of Sweet corn + Spinach (1:4) (T_2), Sweet and Sweet corn + Fenugreek (1:4) (T_1). (Table 2) Increase in Sweet corn Equivalent Yield due to intercropping of leafy vegetables are also reported by Chaudhari *et al.* (2018) [2].

Economics

Intercropping of Sweet corn + Fenugreek (1:4) (T_1) recorded significantly higher system gross returns (Rs. 529413/-) in pooled results, respectively while it was found at par with intercropping of Sweet corn + Spinach(1:4) (T_2),Sweet corn + Dill (1:4) (T_5) and Sweet corn +Safflower(1:4) (T_4). In three years pooled results significantly higher system net returns (Rs. 390247/-) was recorded in Sweet corn + Fenugreek (1:4) (T_1) which was found at par with Sweet corn + Spinach(1:4) (T_2), Sweet corn + Dill (1:4) (T_5) and Sweet corn +Safflower(1:4) (T_4).While intercropping of Sweet corn +Spinach (1:4) (T_2) recorded higher B: C ratio (4.14) followed by Sweet corn + Dill (1:4) (T_5) and Sweet corn +Safflower (1:4) (T_4). (Table 2)

Table 1: Growth and yield attributes of sweet corn as influenced by various intercropping system (Three years pooled mean)

Treatment	Plant height (cm) at			Number of leaves at			Length of cob (cm)	Girth of cob (cm)	Grain rows cob^{-1}
	30 DAS	60 DAS	Harvest	30 DAS	60 DAS	Harvest			
T_1: Sweet corn + Fenugreek (1:4)	75.34	143.58	150.15	6.36	11.31	9.53	30.58	22.93	16.22
T_2: Sweet corn + Spinach(1:4)	66.69	136.84	142.51	5.78	10.53	8.61	28.28	19.20	15.54
T_3: Sweet corn + Coriander (1:4)	71.46	142.29	143.93	6.24	10.49	9.09	29.68	22.50	15.82
T_4: Sweet corn +Safflower(1:4)	66.80	131.38	142.62	5.61	10.10	8.93	27.19	18.87	15.69
T_5: Sweet corn + Dill (1:4)	70.81	143.45	148.28	6.26	11.10	9.20	30.04	21.44	16.18
T_6: Sweet corn + Amaranthus (1:4)	72.36	144.31	145.19	5.79	11.20	8.62	28.25	22.09	15.56
T_7: Sole Sweet corn	82.45	152.08	154.04	6.82	11.62	9.64	31.20	23.20	16.29
S.Em±	0.70	0.86	0.66	0.07	0.14	0.22	0.27	0.22	0.15
C.D. at 5%	2.17	2.66	2.02	0.22	0.44	0.68	0.82	0.66	0.45

Table 2: Yield attributes and yield of sweet corn, SEY and economics as influenced by various intercropping system (Three years pooled mean)

Treatment	Average weight of cob (g)		Cod yield (t ha^{-1})	Green Fodder yield (t ha^{-1})	Harvest Index (%)	Intercrop yield (t ha^{-1})	Sweet corn Equivalent Yield (t ha^{-1})	Cost of cultivation ($Rs.ha^{-1}$)	Gross returns ($Rs.ha^{-1}$)	Net returns ($Rs.ha^{-1}$)	B: C ratio
	with husk	without husk									
T_1: Sweet corn + Fenugreek (1:4)	338	212	15.16	25.69	37.07	14.33	23.64	139166	529413	390247	3.85
T_2: Sweet corn + Spinach (1:4)	306	183	13.22	20.67	38.76	22.88	25.01	125779	513504	387726	4.14
T_3: Sweet corn + Coriander (1:4)	304	179	14.69	22.97	38.93	9.24	16.29	129979	421252	291273	3.27
T_4: Sweet corn +Safflower (1:4)	288	163	12.73	19.94	38.89	23.13	25.30	128522	495898	367377	3.92
T_5: Sweet corn + Dill (1:4)	315	187	15.11	22.66	39.91	14.69	22.84	127448	512063	384615	4.06
T_6: Sweet corn + Amaranthus (1:4)	328	205	14.28	24.48	36.82	7.16	11.14	123572	359257	235685	2.94
T_7: Sole Sweet corn	368	241	16.92	25.82	39.61		16.92	73228	255619	182391	3.55
S.Em±	4.75	5.29	0.31	0.23			0.57		12703	12703	
C.D. at 5%	14.63	16.29	0.97	0.72			1.76		39143	39143	

Conclusion

In pooled results, Intercropping of Sweet corn +Safflower(1:4) (T_1) recorded significantly higher Sweet corn Equivalent Yield (tha^{-1}), which was found at par with intercropping of Sweet corn + Spinach(1:4) (T_2) and Sweet corn + Fenugreek (1:4) (T_1).Sweet corn + Fenugreek (1:4) (T_1) recorded significantly higher system gross and net returns which was found at par with Sweet corn + Spinach (1:4) (T_2), Sweet corn + Dill (1:4) (T_5) and Sweet corn +Safflower(1:4) (T_4). While intercropping of Sweet corn + Spinach (1:4) recorded higher B:C ratio followed by Sweet corn + Dill (1:4).

References

1. Bandyopadhyay SK. Nitrogen and water relations in grain sorghum legume intercropping systems. New Delhi: Indian Agricultural Research Institute; 1984. p. 1-210.
2. Chaudhari KD, Rajemahadik VA, Chavan VG, More VG, Chavan AP. Intercropping of different leafy vegetables under paired row planted sweet corn in lateritic soils of Konkan region of Maharashtra state. Int J Agric. 2018;10(8):5834-5837.
3. Das A, Gnanamurthy AP, Kumar N. Effect of vegetable intercropping and source of nutrient on yield attributing

characters and yield of pigeonpea. Indian J Agron. 2002;47(3):340-344.
4. Jha G, Singh DP, Thakre RB. Production potential of maize (*Zea mays*) + potato (*Solanum tuberosum*) intercropping as influenced by fertilizer and potato genotype. Indian J Agron. 2000;45(1):59-63.
5. Krishnaswamy SA, Ali M, Manoharan S. Productivity and profitability of intercropping in summer cotton and its nitrogen management. Madras Agric J. 1995;82(11):584-587.
6. Kulkarni RV. Studies on intercropping in cotton. Akola: Dr. Punjabrao Deshmukh Krishi Vidyapeeth; 1995.
7. Kagale LA, Rode SP. Nutritional and phytochemical analysis of leafy vegetables from Konkan region, Maharashtra. Int J Health Sci Res. 2023;13(1):111-119.
8. Vilhekar SC, Badole KK, Ghanbahadur MR. Performance and economics of sweet corn as influenced by leafy vegetable intercropping system under rainfed condition. Adv Res J Crop Improv. 2014;5(2):118-121.