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Short Note

Intercropping maize (*Zea mays*) for grain and baby corn with wild marigold (*Tagetes minuta*) under organic conditions in mid-hills of HP Himalaya

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Abstract

Intercropping systems resulted in significantly higher grain maize equivalent yields as compared to sole stands under pure organic conditions. Among different spatial arrangements, 2:1 additive series of tagetes in case of both grain maize and baby corn resulted in better yield of both the crops and baby corn + tagetes 2:1 intercropping system was found to be the best intercropping system resulting in 152 per cent higher maize equivalent yield over sole stand of maize with a, net returns of Rs 58616 /ha and benefit: cost ratio of 1.81.

Key words: Maize, baby corn, marigold, intercropping, organic conditions.

Maize is an important staple food of the farmers living in the hilly areas. Besides its uses as grain and fodder, maize is also used as baby corn in which cobs are used in making soups, pickles and other canned products which fetch very high prices in market. The remains of the crop raised for baby corn production can be used as a nutritive green fodder (Thakur, 2000). These days the urge for organic way of farming is gaining momentum all over the world. The usefulness of compost and farmyard manure has long been recognized in the maintenance of organic matter status, the amelioration of physical, chemical and biological properties of soil (Stevenson, 1982; Swift and Sanchez, 1984). Maize grown in wider rows provides an opportunity of accommodating other crops for additional benefits. Wild marigold (tagetes) earlier considered as a weed, but now an emerging aromatic plant was taken as an intercrop in maize. As the scientific information on spatial pattern of maize and tagetes is lacking, the present investigation was undertaken to work out the best intercropping system of maize and tagetes.

The experiment was laid out in Randomized Block Design with three replications at model organic farm of Department of Agroforestry and Environment, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur during *Kharif* season, 2006. Crops were fertilized with well decomposed farm yard manure, uniformly spread and incorporated in the field @ 30 t/ha prior to ploughing. The field experiment consisted of 11 treatments comprising of all possible combinations of two types of purpose maize viz., grain maize and baby corn and four types of spatial arrangements viz., 1:1, 1:2, 2:1 and broadcasting of tagetes in maize and three sole stands of grain maize, baby corn and tagetes.

Sole crops of maize, baby corn and tagetes recorded significantly higher grain yield of maize, yield of baby corn with husk and tagetes oil respectively as compared to all intercropping

systems (Table 1). The maximum grain yield was obtained with pure grain maize which was 69 per cent more than grain maize + tagetes 1:2 series. Competition of tagetes with maize compared to sole maize was high and that probably affected the yield contributing characters and ultimately the final yield of the crop. Jha *et al.* (2000) also reported improved yield attributes in maize grown as sole stand as compared to intercropping with potato.

In baby corn there was a reduction of yield from 10.75-44.8 per cent with different intercropping patterns. The maximum reduction was observed in 1:2 series where as, in tagetes crop there was a reduction of 106 per cent and 82.5 per cent in tagetes oil yield in 2:1 row patterns of maize + tagetes and baby corn + tagetes, respectively.

The intercropping systems resulted in significantly higher grain maize equivalent yield. Among different spatial arrangements, 2:1 additive series of tagetes in case of both grain maize and baby corn resulted in better growth development and yield of both the crops and was followed by 1:1 additive series of tagetes. All the intercropping systems with baby corn showed better maize equivalent as compared to sole crop or different cropping pattern along with maize and tagetes. The maximum grain maize equivalent yield (84 q/ha) was recorded in baby corn + tagetes grown in 2:1 additive series and registered 152.3 per cent, 26.6 per cent and 60 per cent increase over sole stands, of grain maize, baby corn and tagetes, respectively and was followed by 1:1 additive series of baby corn + tagetes. This baby corn + tagetes 2:1 intercropping systems resulted in higher gross returns (Rs 91,056 /ha), net returns (Rs 58,616 /ha) and benefit: cost ratio (1.81) which, was closely followed by grain maize + tagetes 2:1 intercropping system

Sole baby corn produced more maize equivalent yield than different combinations of grain maize + tagetes as its yield was quite high as compared to sole maize crop. Results are in confirmatory with Singh and Singh (1993) who found higher maize equivalent in maize + french bean intercropping system as compared to sole stand of maize. Although the introduction of tagetes in grain maize increased the maize equivalent yield from 3.3 to 60.3 per cent in different cropping patterns of grain maize + tagetes as compared to sole grain maize but it could not surpass the maize equivalent yield produced in sole baby corn. This might be due to high baby corn yield and more remunerative crop as compared to different combinations of maize with tagetes.Thus intercropping of tagetes with baby corn in 2:1 row ratio was more productive and remunerative than raising sole stands of grain maize, baby corn or tagetes crops. Chaudhary *et al.* (2000) found similar results in maize based intercropping system.

Table 1. Effect of treatments on economic yields, grain maize equivalent yield and economics of different intercropping systems

Treatments	Maize grain yield (q/ha)	Baby corn yield with husk (q/ha)	Oil yield (kg/ha)	Grain maize equivalent yield (q/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	Benefit: cost ratio
Grain maize (sole)	33.3	-	-	33.3	41320	23750	1.35
Baby corn (sole)	-	53.0	-	66.3	79600	50340	1.72
Tagetes (sole)	-	-	69.0	52.6	42100	16800	0.66
Grain maize + Tagetes (1:1)	28.8	-	31.3	53.4	56610	35600	1.69
Grain maize + Tagetes (1:2)	19.7	-	29.1	44.6	46220	23630	1.04
Grain maize + Tagetes (2:1)	31.0	-	24.7	51.9	55820	35930	1.80
Grain maize + Tagetes (broadcast)	22.9	-	26.3	48.2	50258	28808	1.34
Baby corn + Tagetes (1:1)	-	43.6	27.9	81.8	88055	53695	1.56
Baby corn + Tagetes (1:2)	-	36.6	37.8	75.3	80307	43975	1.21
Baby corn + Tagetes (2:1)	-	47.9	27.0	84.0	91056	58616	1.81
Baby corn + Tagetes (broadcast)	-	37.1	32.6	74.7	81248	46288	1.32
CD (P=0.05)	2.22	3.45	3.36	4.94			

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