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Response of seed spices in inter cropping with guava

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Abstract

Sustainability and profitability of farming systems particularly of marginal and small holding facing serious challenges due to declining trend of per capita low availability and shrinking size of operational holdings. To overcome this a field experiment was carried out during 2016-17 to 2019-20 at ICAR-NRC on Seed Spices, Ajmer to investigate the response of intercrop combination (seed spices with guava) for increasing productivity, sustainability and profitability. The experiment comprises of 11 treatments viz., Fenugreek + Guava, Coriander +Guava, Nigella +Guava, Anise + Guava, Ajwain+Guava, Sole Fenugreek, Sole Coriander, Sole Nigella, Sole Anise, Sole Ajwain and Sole Guava are laid in randomized block design with three replications. Results based on three years pooled data revealed that, out of eleven different treatments, sole crops treatment alone recorded highest yield compared to inter crop treatments, however after perusal of data related to economics of production it was observed that fenugreek + guava inter cropping was found most remunerative as it recorded highest net returns and B:C ratio (Rs.105903.00 and 1.82). Thus inter cropping of fenugreek with guava is suggested for getting higher net return and B: C ratio, higher system productivity and profitability.

Keywords: Fruit crops, profitability intercropping, seed spices, system productivity

Introduction

The traditional farming systems, currently in vogue in semi-arid and arid regions of the country, are largely subsistence in nature and are need based. Besides, they are not necessarily efficient in utilization of resources for a given location. This leads to loss of precious natural resources. Declining trend of per capita land availability with shrinking operational holding size poses a serious challenge to the sustainability and profitability of existing farming system specifically in marginal and small households. Diversification of cropping systems not only ensure sustainable return from the field but it also, to some extent, help combat global energy crisis by maximum utilization of natural resources like land, light and water (Pareek *et al.* 2008) [9]. Diversification of cropping systems with inclusion of perennial tree components can play a vital role in meeting the diverse needs of people resorting to them as inter-dependent benefits of the three components, viz. trees, crops and livestock in addition to the 6Fs, i.e. food, fruit, fodder, fuel, fertilizer and fiber from limited land resources. Trees are integral to our traditional farming systems, for the innumerable benefits that they provide (Handa *et al.* 2016) [2]. With an aim to maximize the return from the field and at the same time to minimize the economic losses to the growers, intercropping, in between the tree rows, is better to provide an early cash flow and/or to maximize the land investment. By combining crops on same piece of land that have different growth patterns, (root and shoot), could utilize available water, air, nutrients light etc in a better way. Integration of seasonal crops with fruit trees is a viable approach for enhancing system productivity (Saroj and Krishna, 2017) [11]. Intercropping of seed spices with fruit trees is necessary for increasing system productivity and income of farmers (Anwar *et al.*, 2011 and Meena *et al.*, 2017) [1, 14]. Intercropping of seed spices with fruit trees helps in minimizing risk of farmer in event of adverse climatic condition (Vashishtha *et al.*, 2005 and Mehta *et al.*, 2007) [12, 6]. Most of the seed spice crops are grown in semi arid region. In seed spice growing regions major fruits are ber, pomegranate, guava and aonla therefore; it is the need of the hour to integrate the production of semi arid fruit crops with different cropping sequences so that round the year income could be generated on farmer's field. So the study for enhancing system productivity through intercropping of seed spices with fruit crops was undertaken with view to double the income of seed spice growers.

Materials and Methods

The current investigation was carried out during 2016-17 to 2019-20 at ICAR-NRC on Seed Spices, Ajmer.

The study comprises of 11 treatments viz., Fenugreek + Guava, Coriander +Guava, Nigella +Guava, Anise + Guava, Ajwain+Guava, Sole Fenugreek, Sole Coriander, Sole Nigella, Sole Anise, Sole Ajwain and Sole Guava and the experiment was laid in randomized block design with three replications. The soil of the experimental site was sandy loam contained low organic matter (0.26%), nitrogen (182.63 kg ha⁻¹), phosphorus (13.0 kg ha⁻¹) and adequate available potassium (175 kg ha⁻¹), slightly alkaline with pH (8.04) and EC (0.076 dS m⁻¹). In Rabi season, seed spices were grown

with guava tree as intercropping. Recommended package of practices were followed for seed spices crops as well as guava trees. Phenotypic and yield attributes was recorded in sole crop and intercrop. Yield of seed spices and guava was taken from net plots and converted in kg ha⁻¹. Harvesting of mature and marketable fruits was done and sold them out. Yield of seed spices and fruits was converted into fenugreek equivalent yield based on prices of each seed spices crop and fruits. Statistical analysis was done through procedure prescribed by (Panse & Sukhatme 1985) [8].

$$\text{(Fenugreek equivalent yield) FEY} = \text{Fenugreek yield (Kg/ha)} + \frac{\text{Yield of intercrop (Seed spices)} \times \text{Price of intercrop (seed spices)}}{\text{Market price of fenugreek}}$$

Results and Discussion

Yield of seed spices and guava fruits

Pooled data analysis revealed that with respect to seed spices, days to germination was recorded minimum in sole crops as compared to intercropped with guava. Likewise plant height, secondary branches per plant, pod/umbel/siliqua/plant, umbellate/umbel and seeds/pod/umbellate was found maximum in sole crops as compared to intercropped with guava. Sole crop and as intercrop, the fruit (yield kg/ha) of guava was recorded and highest fruit yield was recorded in fenugreek+guava followed by sole crop, coriander+ guava, ajwain +guava and Nigella + guava, similarly seed spices yield was recorded maximum in all the sole crops viz., sole fenugreek, sole coriander, sole nigella, sole anise and sole ajwain as compared to intercrops which might be due to no competition of other plants except competition within the same species which result in be due to efficient utilization of space and light interception along with nutrient up take and availability of applied nutrients ultimately increased the yield when compared with intercrop yield. Almost similar results were reported by Meena *et al.* (2014) [7] and Choudhuri and Jana (2012) [13].

Among the intercropping treatments marketable yield of all the seed spices as well as guava fruit yield varied

significantly. Fenugreek yield equivalent (FYE) was recorded highest in genugreek+guava followed by coriander+guava, anise+guava and nigella+ guava that is because fenugreek being leguminous crop helps in enhancement in soil fertility resulting higher production of okra vegetable and ber fruits. The results follow the trends reported by Malézieux *et al.* (2009) [4] and Singh and Solanki (2015) [10].

Economic analysis of seed spices intercropping with guava

The economic analysis of seed spices intercropping with guava was revealed that, cost of cultivation (Rs/ha) of seed spices was recorded similar in sole and intercrops however guava cost of cultivation was found higher as compared to sole and seed spices intercropping. Gross return and total cost was recorded highest in fenugreek+guava followed by coriander+guava, anise+guava, ajwain+guava and Nigella+guava as compared to sole cropping system. Net return was estimated higher in intercropping treatments and highest was recorded in fenugreek+guava followed by coriander+guava, anise_guava and ajwain+guava.

Thus, it can be inferred that intercropping of fenugreek in guava orchards was found better for realizing higher system productivity, net return and BCR.

Table 1: Effect of guava tree on growth and yield of seed spices intercropping (Pooled data 2016-17 to 2019-20)

Treatments	Days to Germination	Plant height (cm)	Secondary branches/ plant	Pods/umbel/siliqua/ plant	Umbellates/ umbel	Seeds/ pod/umbellate
Fenugreek+ Guava	4.00	73.00	8.00	25.00	0.00	17.00
Coriander +Guava	13.00	96.00	39.00	50.00	40.00	50.00
Nigella +Guava	14.00	66.00	22.00	35.00	0.00	81.00
Anise + Guava	18.00	67.00	16.00	31.00	14.00	18.00
Ajwain+Guava	14.00	121.00	187.00	237.00	16.20	22.00
Sole Fenugreek	3.00	78.00	8.00	31.00	0.00	18.00
Sole Coriander	13.00	104.00	44.00	52.00	44.00	50.00
Sole Nigella	14.00	67.00	24.00	39.00	0.00	94.00
Sole Anise	17.00	73.00	18.00	31.00	16.90	19.00
Sole Ajwain	13.00	128.00	227.00	270.00	18.00	23.00
Sole Guava	0.00	0.00	0.00	0.00	0.00	0.00
C.D. at 5%	1.18	7.00	4.87	8.40	2.60	3.50
SEm ±	0.40	2.34	1.63	2.82	0.82	1.20
C.V. %	6.03	5.14	5.22	6.70	11.20	5.70

Table 2: Effect of seed spices on guava yield and fenugreek equivalent yield (Pooled data 2016-17 to 2019-20)

Treatments	Fruit yield (kg/ha.)	Yield of seed spices (kg / ha.)	Fenugreek equivalent yield (kg/ha)
Fenugreek+Guava	5840.00	1484.00	3917.33
Coriander+Guava	5396.63	710.00	3195.26
Nigella+Guava	4993.67	220.00	2704.03
Anise+Guava	4816.67	650.00	3036.11
Ajwain + Guava	5099.77	650.08	2948.34
Sole Fenugreek	0.00	1510.00	1510.00
Sole Coriander	0.00	910.50	1214.00
Sole Nigella	0.00	340.00	963.33
Sole Anise	0.00	700.00	1108.33
Sole Ajwain	0.00	870.00	1102.00
Sole Guava	5475.37	0.00	2281.40
C.D. at 5%	556.16	162.00	488.29
SEm ±	187.21	55.00	164.37
C.V. %	12.00	13.00	13.06

Table 3: Cost and return in different seed spices intercropping with guava

Treatments	Cost of cultivation (Rs/ha)		Gross retrun (Rs/ha)	Total cost (Rs/ha)	Net return (Rs/ha)	B: C Ratio
	Seed spice	Gouava				
Fenugreek+Guava	51465.00	77672.00	235040.00	129137.00	105903.00	1.82
Coriander+Guava	54326.00	77672.00	191715.75	131998.00	59717.75	1.45
Nigella+Guava	52608.00	77672.00	162241.75	130280.00	31961.75	1.25
Anise+Guava	51105.00	77672.00	182166.75	128777.00	53389.75	1.41
Ajwain + Guava	52016.00	77672.00	176900.33	129688.00	47212.33	1.36
Sole Fenugreek	51465.00	0.00	90600.00	51465.00	39135.00	1.76
Sole Coriander	54326.00	0.00	72840.00	54326.00	18514.00	1.34
Sole Nigella	52608.00	0.00	57800.00	52608.00	5192.00	1.10
Sole Anise	51105.00	0.00	66500.00	51105.00	15395.00	1.30
Sole Ajwain	52016.00	0.00	66120.00	52016.00	14104.00	1.27
Sole Guava		77672.00	136884.25	77672.00	59212.25	1.76

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