



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2020; 8(1): 2517-2519

© 2020 IJCS

Received: 27-11-2019

Accepted: 30-12-2019

Bhagat SB

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Wartha SR

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Dahiphale AV

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Mhaskar NV

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Mardane RG

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Puri MG

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Corresponding Author:**Bhagat SB**

Dr. Balasaheb Sawaant Konkan
Krishi Vidyapeeth, Dapoli,
Maharashtra, Maharashtra,
India

Effect of Intercropping of groundnut and cowpea with mustard (*Brassica juncea* L.) on yield levels and economics of system under red lateritic soils of western coastal region

Bhagat SB, Wartha SR, Dahiphale AV, Mhaskar NV, Mardane RG and Puri MG

DOI: <https://doi.org/10.22271/chemi.2020.v8.i1a1.8648>

Abstract

A field experiment on “Intercropping of groundnut and cowpea with mustard (*Brassica juncea* L.)” was conducted during *rabi*, 2018-19 at Agronomy Farm, College of Agriculture, Dapoli (M.S.) with objectives to quantify the effect of intercropping on main as well as intercrops in terms of their growth, yield, quality, N,P,K uptake and economics of intercropping systems. Conclusionary findings are abstracted below. The intercrops like groundnut and cowpea being leguminous crops, improved the growth performance of mustard. However, growth performance of both the intercrops was better under their sole stands. The yield attributes and yield of mustard was improved due to intercropping system. In general, within the intercropping systems, when mustard was grown with groundnut, yield performance of mustard was better, followed by mustard + cowpea. Maximum values of nitrogen, phosphorous and potassium content in grain and straw of mustard and quality parameters were recorded in case of mustard + groundnut in 3:1 proportion. However, total uptake of these nutrients was higher at sole cropping. For the production of higher total biomass, mustard equivalent yield (MEY) and to earn more net profit, mustard + groundnut intercropping system should followed in 1:1 row proportion.

Keywords: Intercropping, groundnut, cowpea and yield

1. Introduction

Oilseed constitute the second largest agriculture commodity in India after cereals accounting for nearly 6 per cent of gross national product and 10 per cent of the value of all agriculture products. Despite the fact that India is one of the leading oilseeds producing countries in the world, it is not able to meet the edible oil requirement for its vast population. In India, vegetable oil is mainly derived from nine oilseeds among which mustard ranks second to groundnut in area and production. It is mostly grown in northern or north-eastern region of India either sole or intercropped with wheat, gram or pea. Among the oilseeds, rapeseed-mustard group occupies prominent position in the country during winter season.

Intercropping is recommended to be used in many parts of the world for food or fibres productions, because of its overall high productivity, effective control of pests and diseases, good ecological services and economic profitability. In an intercropping system, there are often two or more crop species grown in the same field for a certain period of time, even though the crops are not necessarily sown or harvested simultaneously. In practice, most intercropping systems involve only two crops, as inclusion of more crops results in higher labour costs. Mostly, intercropping is practiced with the aim of maximum plant competition rather than plant competition for maximum crop yield.

Keeping the in view importance of the intercropping system, the proposed research entitled “Intercropping of groundnut and cowpea with mustard (*Brassica juncea* L. Czern. & Coss.)” was conducted at Agronomy Farm, College of Agriculture, Dapoli during *rabi* season of 2018

2. Materials and Methods

The present investigation entitled “Intercropping of groundnut and cowpea with mustard (*Brassica juncea* L.)” was carried out during *rabi* season of 2018 at Agronomy Farm, College of Agriculture Dapoli.

The results of the present investigation analyzed using Randomized Block Design are discussed critically under this chapter.

In the present investigation mustard (Varuna) was grown with groundnut (Konkan Tapora) and cowpea (Konkan Sadabhar) in different intercropping proportions on row basis of 1:1, 1:2, 1:3, 2:1 and 3:1. This was a replacement series of intercropping system, wherein as per row proportion the lines of mustard were replaced by either groundnut or cowpea. The main/base crop (mustard) and two intercrops (groundnut and cowpea) were planted at 30 X 15 cm spacing. Sole crop treatments of all the crops were also included to study the comparative performance of the planting patterns. In case of sole crops as well as in case of intercropping system, crops were fertilized with their respective recommended doses, i.e. mustard with 90 kg N + 45 kg P₂O₅ per hectare, groundnut 25 kg N + 50 kg P₂O₅ per hectare, and cowpea 25 kg N + 50 kg P₂O₅ per hectare. In all, total thirteen treatments were tested in Randomized Block Design with three replications. The other common package of practices was followed time to time and periodical growth observations were recorded and economics were calculated.

3. Results

3.1 Study of main crop + intercrop

3.1.1 Indices observed in intercropping treatment

3.1.1.1 Relative yield

The data regarding relative yield of mustard and intercrops as affected by various treatments are presented in Table 29. The data were not statistically analyzed, hence, inferences were drawn from mean values. The relative yield of mustard recorded under 3:1 ratio of mustard + groundnut system was

higher than all remaining intercropping treatments. Among all the intercropping system, maximum relative yield was recorded under 3:1 ratio followed by 2:1 and 1:1 ratios in that order, except in mustard + groundnut and mustard + cowpea system, where relative mustard yield was same under 1:3 ratio. As regards intercrops, relative yield was higher under 1:3 ratio followed by 2:1 and 1:1 ratios in all the intercropping system.

3.1.1.2 Land equivalent ratio (LER)

Data regarding comparative coefficient as affected by different treatments are presented in Table 29. The data were not statistically analyzed, hence, inferences were drawn from mean values.

Under the almost all intercropping treatment, LER was more than one. Mustard + groundnut 1:1 ratio recorded the highest LER than all other intercropping treatments. In different planting patterns, 1:1 ratio recorded more LER followed by 2:1 and 3:1 ratios, respectively.

3.1.1.3 Mustard grain equivalent ratio (q/ha):

The data regarding mustard grain equivalent yield as affected by different treatments are presented in Table 29.

The data were not statistically analyzed, hence, inferences were drawn from mean values. The maximum grain equivalent yield was recorded under mustard + groundnut in 1:1 and 1:3 proportion and Mustard + cowpea 2:1 proportion recorded higher mustard grain equivalent yield than sole mustard. In different intercropping system, mustard grain equivalent yield recorded under 1:1 ratio was higher followed by 1:2 and 1:3 ratios, in that order.

Table 29: Relative Yield and LER of the Cropping System

Treatments	Relative yield (RY)		LER	Mustard equivalent yield (q/ha)	
	Mustard	Inter-crop			
T1	Sole Mustard	1.00	-	1.00	23.21
T2	Sole Groundnut	-	1.00	1.00	28.84
T3	Sole Cowpea	-	1.00	1.00	21.50
T4	Mustard + Groundnut (1:1)	0.59	0.56	1.15	29.54
T5	Mustard + Cowpea (1:1)	0.57	0.57	1.14	25.18
T6	Mustard + Groundnut (1:2)	0.37	0.68	1.05	27.85
T7	Mustard + Cowpea (1:2)	0.36	0.66	1.02	22.50
T8	Mustard + Groundnut (1:3)	0.28	0.77	1.05	28.29
T9	Mustard + Cowpea (1:3)	0.28	0.77	1.05	22.56
T10	Mustard + Groundnut (2:1)	0.69	0.38	1.07	26.64
T11	Mustard + Cowpea (2:1)	0.68	0.40	1.08	24.03
T12	Mustard + Groundnut (3:1)	0.78	0.29	1.07	26.23
T13	Mustard + Cowpea (3:1)	0.76	0.33	1.09	24.50

3.2 Economics of the treatments

Data pertaining to mean total cost of cultivation, gross returns, net returns, cost-benefit ratio are presented in Table 32 and depicted in Fig.22. Data were not analyzed statistically and therefore, inferences are drawn from mean values.

It is clear from the data presented in Table 32. There was considerable difference between total cost of cultivation due to different treatments under study.

Data revealed that among the sole stands of different crops, sole groundnut recorded the maximum gross returns and net

profit of Rs. 2, 17,292 and Rs.95, 248 ha⁻¹ respectively, while, higher B:C ratio (2.17) was recorded due to sole cropping of mustard.

In case of intercropping treatments, mustard + groundnut in 1:1 row proportion recorded the maximum gross returns and net profit of Rs. 2,23,871 and Rs.1,34,354 ha⁻¹ respectively, which were higher than rest of the intercropping treatments and even sole stands of different crops under study. The highest B:C ratio (3.03) was recorded due to mustard + cowpea in 3:1 row proportion.

Table 1: Mean total cost, gross return, net return and B:C ratio as influenced by different treatments

Treatments	Total cost (Rs. ha ⁻¹)	Gross returns (Rs. ha ⁻¹)	Net returns (Rs. ha ⁻¹)	B:C ratio
Sole Mustard	117622	176977	59355	1.50
Sole Groundnut	122044	217292	95248	1.78
Sole Cowpea	73808	160090	86282	2.17
Mustard + Groundnut (1:1)	89517	223871	134354	2.50
Mustard + Cowpea (1:1)	65399	189938	124539	2.90
Mustard + Groundnut (1:2)	100360	210539	110179	2.10
Mustard + Cowpea (1:2)	68202	169164	100962	2.48
Mustard + Groundnut (1:3)	105781	212928	107147	2.01
Mustard + Cowpea (1:3)	69604	168506	98902	2.42
Mustard + Groundnut (2:1)	78674	202518	123844	2.57
Mustard + Cowpea (2:1)	62596	182107	119511	2.91
Mustard + Groundnut (3:1)	73254	199302	126048	2.72
Mustard + Cowpea (3:1)	61195	185610	124415	3.03

4. Discussion

In general, it was also noticed that within the intercrops, mustard + groundnut showed better performance followed by mustard + cowpea. Within the planting proportions, it was noticed that mustard benefited more with regards to yield contributing characters in 1:3, 1:2 and 2:1 proportion in that order. This might be due to better resource utilization and better sink of photosynthetic produce of crop onto its yield parameters which reflected into better yield contributing characters. These results are in conformity with results reported by Mahadkar (1983)^[6], Bandyopadhyay and De (1986)^[2], Jat and Ahlawat (2009)^[4], Mehta (2010)^[7], Choudhuri and Jana (2015)^[1].

4.1 Economics of treatment combinations

The adoption of any technology by farmers depends upon its cost effectiveness. The same principle is followed while selecting the intercropping and nitrogen levels. Therefore, while arriving at any conclusion and deriving any inference, a detail economic analysis is the must. In present investigation, sole groundnut recorded the maximum gross returns and net profit of Rs. 2,17,292 and Rs.95,248 ha⁻¹ respectively, while, higher B:C ratio (2.17) was recorded due to sole cropping of mustard.

In case of intercropping treatments, mustard + groundnut in 1:1 row proportion recorded the maximum gross returns and net profit of Rs. 2,23,871 and Rs.1,34,354 ha⁻¹ respectively, which were higher than rest of the intercropping treatments and even sole stands of different crops under study. The highest B:C ratio (3.03) was recorded due to mustard + cowpea in 3:1 row proportion. These result are in line with that reported by Mahadkar and Khanvilkar (1988), More (1990)^[8], Choudhuri and Jana (2015)^[1] and Jakhar *et al.* (2015)^[3].

5. References

- Choudhuri P, Jana JC. Growth, Yield, Quality and Economic Impacts of Intercropping in Potato. *Agricultural and Biological Sciences Journal*. 2015; 1:6-9.
- Bandyopadhyay SK, De R. Plant growth and seed yield of sorghum when intercropped with legumes. *J Agric. Sci., Camb*. 1986; 107:621-627.
- Jakhar P, Adhikary PP, Naik BS, Madhu M. Finger millet groundnut strip cropping for enhanced productivity and resource conservation in upland of eastern ghat of odisha. *Indian J Agron*. 2015; 60(3):365-371.
- Jat HS, Ahlawat IPS. Response of pigeonpea (*Cajanus cajan*) + groundnut (*Arachis hypogaea*) intercropping system to planting pattern and phosphorus management. *Indian J of Agronomy*. 2009; 48(3):156-159. Kushwaha.
- Mahadkar UV, Khalvilar SA. Effects of intercropping of pulses on yield of ragi and nitrogen balance under Konkan condition. *J Maharashtra Agric. Univ*, 1990; 15(1):102-103.
- Mahadkar UV. Study of mixed cropping in kharif nagli (*Eleusina corracana* G.) With some important pulses under high rainfall condition of Konkan. M.Sc. (Agri) Thesis, K. K. V., Dapoli, Maharashtra, 1983.
- Mehta RS, Meena SS, Anwer MM. Performance of coriander (*Coriandrum sativum*) based intercropping systems. *Indian Journal of Agronomy*. 2010; 55(4):286-289.
- More VG. Study of intercropping of some oilseed and pulse crops in kharif finger millet (*Eleusine coracana* G.) Under high rainfall condition of Konkan. M.Sc. (Agri.) Thesis, K.K.V., Dapoli. Maharashtra, 1990.
- Singh Vipul, Ghanshyam Singh, Vinay Kumar Pandey, Manoj Kumar, Ajay Singh. Performance of chickpea-mustard intercropping on yield and economics of chickpea and mustard crop under different fertility management and various row combinations *Int. J Curr. Microbiol. App. Sci*. 2011; 8(1):236-249.