Research Article

Evaluation of Integrated Nutrient Management Practices on Yield and Economics of Chilli var. kashmir long (*Capsicum annuum* L.)

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Abstract

The present study was carried out during 2013 and 2014 *Kharif* season at Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, India; with 18 recommended treatment combinations viz., inorganic fertilizer, farmyard manure, sheep manure, poultry manure and vermin-compost. Fertilizer dose 50% +FYM, fertilizer dose 50% + Sheep manure, fertilizer dose 50% + Poultry manure, fertilizer dose 50% + Vermi-compost, fertilizer dose 50% + Bio-fertilizers, fertilizer dose 50% + FYM + Sheep manure + Poultry manure + Vermi-compost + Bio-fertilizers, fertilizer dose 75% + FYM, fertilizer dose 75% + Sheep manure, fertilizer dose 75% + Poultry manure, fertilizer dose 75% + Vermi-compost, fertilizer dose75 % + Bio-fertilizers, fertilizer dose 75% + FYM +Sheep manure + Poultry manure + Vermi-compost + Bio-fertilizers and control in randomize block design with 3 replications. Combined application of Recommended fertilizer dose75 % + FYM + Sheep manure + Poultry manure + Vermi-compost + Bio-fertilizers recorded significantly higher values for fruit length (10.41 cm), fruit girth (1.92 cm), number of fruits per plant (58.42), average fruit weight (7.92 g), fruit yield per plant (512.28 g), fruit yield per plot (15.62 kg), red ripe fruit yield per hectare (173.42 q) and dry fruit yield per hectare (55.65 q). However in terms of benefit cost ratio combined application of RFD 75% + FYM + Sheep manure + Poultry manure + Vermi-compost + Bio-fertilizers was economical with highest net returns (`345672.40 ha-1) and B:C (4.47).

Keywords: Chilli, INM, Yield, Economics, FYM

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Introduction

Cultivated Peppers are members of genus Capsicum. Their production and consumption have steadily increased worldwide due to their role as both vegetable and spice. Just as their Solanaceous cousins tomatoes and potatoes, pepper have rapidly become an important component of diverse cuisines around the world. This is reflected in the large acreages devoted to their production in countries like India, Mexico, China, Korea and United States. Much of the recent alteration focused on peppers can be attributed to their unique pungency which has made them important spice in the cuisines of various countries. Chilli (*Capsicum annuum* L.) popularly known as "King of spices" is one of the important commercial crops of India. It is a crop of tropical and sub-tropical regions and requires a warm humid climate. It can be grown in well-drained, loamy soils rich in organic matter. It has been originated in South America and was introduced to India by Portuguese in the seventeenth century. It belongs to the family Solanaceae, genus Capsicum and two main species are Capsicum annuum and Capsicum frutescens. It is cultivated in almost all Indian states, although it is concentrated mainly in southern states. India contributes one fourth of world's production of chilli and is mainly grown in Andhra Pradesh, Karnataka, Tamil Nadu and Orissa.Chilli fruits are excellent source of vitamin A and C. They are also rich in minerals like sodium, potassium, magnesium, copper, manganese, molybdenum and zinc. Green chilli cultivars contain about 85.70 gm moisture, 2.90 gm protein, 6.80 gm fibre and 0.60 gm fat per 100 gm [1]. In addition to this they have also received attention recently for their potential as nutraceuticals. This is due to their high level of phytochemicals which include carotenoids, flavoniods, ascorbic acid, phenolic compounds and capsinoids [2, 3]. The septa and placenta tissues contain the pungent principle capsaicin. The pungency in chilli is due to the alkaloid 'capsaicinoid'. Chilli is being used in food and beverage industries for its

oleoresin which imparts characteristic colour and flavour to food. Hence, chilli finds diverse utility as a spice, condiment, culinary supplement and vegetable. The pungent compounds are also utilized extensively in the pharmaceutical industry for their analgesic properties [4]. These are also being utilized for other industrial purposes such as the deterrence of various parts in crops, wood products as plastic cable coatings. Chilli production has to be increased primarily from enhancing the productivity with a combination of high yielding plant types [5], standard agronomic practices like seed priming [6] and balanced plant nutrition attained through integrated nutrient management (INM). After the green revolution, increase in production was achieved at the cost of soil health. It has been proved that indiscriminate use of inorganic fertilizers results in decrease in soil fertility and increase in soil acidity with depletion of organic humus content in addition to poor crop quality. Use of organic manures to meet the nutrient requirements of crop would be an inevitable practice in the years to come for sustainable agriculture since organic manures not only improve the soil physical, chemical and biological properties [7], but also improves the moisture holding, thus resulting in enhanced crop productivity along with better quality of crop produce [8] Hence fertilizers, manures and other amendments either alone or in combinations could be used to develop nutrient supplying capacity of the soil [9]. At the same time, the cost of chemical fertilizers is also increasing day by day hence, adoption of integrated plant nutrient offers scope for sustainable crop production and improves soil fertility.

Materials and Methods

The present investigation was carried out at Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir having 34^{o}9/ 22// N latitude, 74^{o}53/ 20// E longitude and 1606 m above mean sea level for two consecutive seasons during Kharif 2013 and 2014 on chilli var. Kashmir Long-1with an objective to study the effect of organic and inorganic sources of fertilizer in different combination on its yield and economics. The experimental site had pH(6.52), electrical conductivity(0.101), organic carbon(1.04%) available N (275.8 kg N ha-1) and high in available P2 O5 (74.5 P2 O5 kg ha-1) and K2 O (294.5 kg ha-1).The experiment was laid out in randomized block design with three replications comprised of 18 treatment combinations viz. T1 - Recommended dose of NPK, T2- Farmyard manure,T3- Sheep manure,T4 - Poultry manure,T5 – Vermi-compost, T6-RFD 50% + FYM, T7 - RFD 50% + SM, T8 - RFD 50% + PM, T9 - RFD 50% + VC, T10 - RFD 50% + BF,T11-RFD 50% + FYM + SM + PM +VC + BF, T12 -RFD 75% + FYM, T13-RFD 75% + SM,T14 -RFD 75% + PM,T15-RFD 75% +VC,T16-RFD 75 % + BF,T17- RFD 75% + FYM (50%) + SM (50%) + PM(50%) +VC (50%)+BF(100%), and T18- Control (No Organic/Chemical fertilizers). Organic manures were applied (on equal N basis) as per the treatment and incorporated into the soil before sowing. The seedlings were planted in the plots measuring 3 x 3 m with spacing of 30 x 45 cm. Multiple pickings were taken from red ripe chilli for six times and dried. Immediately after that their dry yield was recorded. The weight of each picking was added to get the total dry chilli yield. Observations were recorded on fruit length, fruit girth, number of fruits per plant, average fruit weight, fruit yield per plant, fruit yield per plot, red ripe fruit yield and were analyzed statistically as Gomez^{-1} and Gomez (1984)[10]. Other cultural operations and plant protection measures were followed as per the recommendations.

Results and Discussion

Red ripe chilli yield in relation to yield attributes

Integrated nutrient management practices exerted significant influence on yield parameters like fruit length(cm), fruit girth(cm), number of fruits per plant, average fruit weight(g) during both the years of investigation. During both years of study significant increase in fruit length (10.41 cm), fruit girth (1.92 cm), number of fruits per plant (58.42), average fruit weight (7.92 g), was observed with combined application of Recommended fertilizer dose75 % + Farmyard manure + Sheep manure + Poultry manure + Vermicompost + Biofertilizers. However, significantly the lowest fruit length (7.43cm), fruit girth (1.67 cm), number of fruits per plant (50.32), average fruit weight (6.67 g), was observed with control. (**Tables 1** and **2**) The increase in yield parameters may be due to increase in growth and morphological parameters in the early stages of crop growth, indicate the efficiency of the plant to trap the available solar radiation efficiently which resulted in the increased rates of assimilates which in turn were used up in the fruit formation, thus ultimately increased the number of fruits plant^{-1}. The reasons for increased fruit weight and size in chilli was attributed to balanced C:N ratio, more decomposition, more mineralization, more availability of native and applied macro and micro nutrients, more solubilization effect and availability of nutrients by the addition of organic manures and more physiological activity leading to the buildup of sufficient food reserves for the developing sinks and better portioning towards the developing fruits. These results are in accordance with the findings of Abusaleha and Sahanmugavelu [11]. During both years of study yield showed highly significant variation among the treatments. However increase in fruit yield per plant (512.28 g), fruit yield per plot (15.62 kg), red ripe fruit yield per hectare

(173.42 q) and dry fruit yield per hectare (55.65 q) was observed with combined application of Recommended fertilizer dose75 % + Farmyard manure + Sheep manure + Poultry manure + Vermicompost + Biofertilizers (**Tables 3** and **4**).

Table 1 Effect of Integrated nutrient management on fruit length (cm) and fruit girth (cm) of chilli

Symbols	Treatments	Fruit length (cm)			Fruit girth (cm)		
		Kharief (2013)	Kharief (2014)	Pooled	Kharief (2013)	Kharief (2014)	Pooled
T_1	Control	7.32	7.52	7.43	1.67	1.65	1.67
T_2	Farm Yard Manure @ 25 t ha^{-1}	7.90	7.80	7.87	1.70	1.69	1.69
T_3	Sheep Manure @ 20 t ha^{-1}	7.90	8.10	8.00	1.73	1.70	1.71
T_4	Poultry manure @ 6 t ha^{-1}	8.00	8.13	8.11	1.75	1.72	1.73
T_5	Vermi-compost @ 5 t ha^{-1}	7.98	7.82	7.92	1.71	1.69	1.70
T_6	RFD (50%) + Farmyard Manure (100%)	8.30	8.26	8.29	1.77	1.76	1.76
T_7	RFD 50% + Sheep Manure (100%)	8.42	8.52	8.49	1.79	1.78	1.79
T_8	RFD 50%+ Poultry manure (100%)	8.58	8.60	8.60	1.80	1.79	1.80
T_9	RFD 50% + Vermi-compost (100%)	8.32	8.31	8.32	1.76	1.77	1.76
T_{10}	RFD 50% + Bio-fertilizers (100%)	8.05	8.12	8.09	1.76	1.74	1.75
T_{11}	RFD 50% +FYM+SM+PM+VC+BF (100%)	9.12	8.80	8.97	1.83	1.82	1.83
T_{12}	RFD (75%) + Farm Yard Manure (100%)	9.18	8.98	9.09	1.85	1.83	1.85
T_{13}	RFD (75%) + Sheep Manure (100%)	9.86	9.45	9.67	1.91	1.92	1.91
T_{14}	RFD (75%) + Poultry manure (100%)	10.17	9.56	9.87	1.94	1.95	1.94
T_{15}	RFD (75%) + Vermicompost (100%)	9.10	9.35	9.24	1.87	1.85	1.86
T_{16}	RFD (75%) + Biofertilizers (100%)	8.87	8.76	8.82	1.81	1.80	1.82
T_{17}	RFD (75%) + FYM (50%) + SM (50%) + PM (50%) + VC (50%) + BF (100%)	10.56	10.25	10.41	1.92	1.93	1.92
T_{18}	Recommended fertilizer dose(120 :80:60 kg ha^{-1})	9.20	9.00	9.10	1.90	1.91	1.90
Statistical significance at CD ($p< 0.05$ i.e., 5%)		0.100	0.110	0.102	0.016	0.020	0.017

Table 2 Effect of Integrated nutrient management on number of fruits $plant^{-1}$ and average fruit weight (g) of chilli

Symbols	Treatments	Number of fruits $plant^{-1}$			Average fruit weight (g)		
		Kharief (2013)	Kharief (2014)	Pooled	Kharief (2013)	Kharief (2014)	Pooled
T_1	Control	50.60	50.00	50.32	6.71	6.61	6.67
T_2	Farm Yard Manure @ 25 t ha^{-1}	52.22	52.36	52.29	6.84	6.82	6.84
T_3	Sheep Manure @ 20 t ha^{-1}	52.55	52.86	52.72	6.87	6.86	6.87
T_4	Poultry manure @ 6 t ha^{-1}	52.89	52.92	52.91	6.89	6.87	6.89
T_5	Vermicompost @ 5 t ha^{-1}	52.30	52.47	52.37	6.86	6.85	6.86
T_6	RFD (50%) + Farmyard Manure (100%)	53.12	53.46	53.30	6.93	6.96	6.93
T_7	RFD 50% + Sheep Manure (100%)	53.42	53.72	53.58	6.96	6.99	6.96
T_8	RFD 50%+ Poultry manure (100%)	53.50	53.81	53.66	6.98	7.00	6.98
T_9	RFD 50% + Vermicompost (100%)	53.22	53.51	53.37	6.94	6.97	6.95
T_{10}	RFD 50% + Biofertilizers (100%)	53.00	53.02	53.00	6.92	6.94	6.93
T_{11}	RFD 50% +FYM+SM+PM+VC+BF (100%)	54.22	54.40	54.33	7.07	7.10	7.10
T_{12}	RFD (75%) + Farm Yard Manure (100%)	54.32	54.71	54.53	7.09	7.10	7.15
T_{13}	RFD (75%) + Sheep Manure (100%)	55.58	55.43	55.51	7.24	7.35	7.30
T_{14}	RFD (75%) + Poultry manure (100%)	56.23	56.00	56.14	7.57	7.65	7.62
T_{15}	RFD (75%) + Vermicompost (100%)	54.91	55.12	55.05	7.12	7.22	7.19
T_{16}	RFD (75%) + Biofertilizers (100%)	53.88	54.10	53.98	7.00	7.12	7.07
T_{17}	RFD (75%) + FYM (50%) + SM (50%) + PM (50%) + VC (50%) + BF (100%)	58.27	58.54	58.42	7.93	7.88	7.92
T_{18}	Recommended fertilizer dose(120 :80:60 kg ha^{-1})	54.72	54.89	54.77	7.10	7.16	7.13
Statistical significance at 5% level of significance [CD ($p< 0.05$)]		0.160	0.153	0.131	0.050	0.060	0.060

Table 3 Effect of Integrated nutrient management on fruit yield plant^{-1} (g) and fruit yield plot^{-1} (g) of chilli

Symbols	Treatments	Fruit yield plant^{-1} (g)			Fruit yield plot^{-1} (kg)		
		Kharief (2013)	Kharief (2014)	Pooled	Kharief (2013)	Kharief (2014)	Pooled
T_1	Control	386.36	385.39	385.88	12.72	12.89	12.82
T_2	Farm Yard Manure @ 25 t ha^{-1}	409.82	408.96	409.40	13.16	13.20	13.19
T_3	Sheep Manure @ 20 t ha^{-1}	413.32	415.56	414.46	13.26	13.29	13.29
T_4	Poultry manure @ 6 t ha^{-1}	418.24	417.23	417.76	13.33	13.36	13.36
T_5	Vermicompost @ 5 t ha^{-1}	410.95	411.82	411.35	13.23	13.25	13.25
T_6	RFD (50%) + Farmyard Manure (100%)	422.12	419.21	420.64	13.35	13.47	13.42
T_7	RFD 50% + Sheep Manure (100%)	426.16	423.23	424.70	13.45	13.55	13.51
T_8	RFD 50%+ Poultry manure (100%)	428.20	425.43	426.82	13.57	13.62	13.58
T_9	RFD 50% + Vermicompost (100%)	424.23	420.25	422.34	13.38	13.47	13.44
T_{10}	RFD 50% + Biofertilizers (100%)	420.12	419.16	419.66	13.34	13.36	13.34
T_{11}	RFD 50% +FYM+SM+PM+VC+BF (100%)	438.52	430.64	434.59	13.78	13.68	13.72
T_{12}	RFD (75%) + Farm Yard Manure (100%)	447.52	432.64	440.12	13.86	13.72	13.78
T_{13}	RFD (75%) + Sheep Manure (100%)	469.73	450.63	460.22	14.10	14.00	14.10
T_{14}	RFD (75%) + Poultry manure (100%)	490.41	480.78	485.32	14.70	14.61	14.67
T_{15}	RFD (75%) + Vermicompost (100%)	457.29	440.61	448.88	13.92	13.80	13.87
T_{16}	RFD (75%) + Biofertilizers (100%)	432.22	424.64	428.32	13.70	13.64	13.66
T_{17}	RFD (75%) + FYM (50%) + SM (50%) + PM (50%) + VC (50%) + BF (100%)	512.13	513.71	512.28	15.66	15.56	15.62
T_{18}	Recommended fertilizer dose(120 :80:60 kg ha^{-1})	436.16	427.64	431.82	13.90	13.78	13.86
Statistical significance at 5% level of confidence CD (p< 0.05)		3.700	3.570	3.655	0.060	0.070	0.062

Table 4 Effect of integrated nutrient management on fruit yield ha^{-1} (q) and dry fruit yield ha^{-1} (q) of chilli

Symbols	Treatments	Fruit yield ha^{-1} (q)			Dry fruit yield ha^{-1} (q)		
		Kharief (2013)	Kharief (2014)	Pooled	Kharief (2013)	Kharief (2014)	Pooled
T_1	Control	141.36	143.22	142.25	26.23	26.17	26.12
T_2	Farm Yard Manure @ 25 t ha^{-1}	146.22	146.66	146.42	31.24	31.22	31.27
T_3	Sheep Manure @ 20 t ha^{-1}	147.33	147.64	147.47	34.12	34.22	34.25
T_4	Poultry manure @ 6 t ha^{-1}	148.12	148.43	148.25	35.76	35.50	35.25
T_5	Vermicompost @ 5 t ha^{-1}	146.97	147.21	147.12	33.16	33.39	33.22
T_6	RFD (50%) + Farmyard Manure (100%)	148.32	149.62	148.97	39.65	39.62	39.65
T_7	RFD 50% + Sheep Manure (100%)	149.44	150.52	149.98	41.92	41.59	41.23
T_8	RFD 50%+ Poultry manure (100%)	150.75	151.32	151.11	42.86	42.87	42.81
T_9	RFD 50% + Vermicompost (100%)	148.66	149.64	150.21	40.62	40.48	40.25
T_{10}	RFD 50% + Biofertilizers (100%)	148.21	148.46	148.30	37.62	37.46	37.22
T_{11}	RFD 50% +FYM+SM+PM+VC+BF (100%)	153.12	151.97	152.53	43.32	43.30	43.32
T_{12}	RFD (75%) + Farm Yard Manure (100%)	153.99	152.44	153.21	44.52	44.35	44.24
T_{13}	RFD (75%) + Sheep Manure (100%)	156.68	155.54	156.12	47.24	47.21	47.22
T_{14}	RFD (75%) + Poultry manure (100%)	163.33	162.33	162.82	48.25	48.26	48.25
T_{15}	RFD (75%) + Vermicompost (100%)	154.67	153.33	153.97	46.23	46.25	46.25
T_{16}	RFD (75%) + Biofertilizers (100%)	152.22	151.55	151.86	42.24	42.19	42.12
T_{17}	RFD (75%) + FYM (50%) + SM (50%) + PM (50%) + VC (50%) + BF (100%)	173.96	172.89	173.43	55.98	55.80	55.65
T_{18}	Recommended fertilizer dose(120 :80:60 kg ha^{-1})	154.52	153.12	153.75	45.22	45.26	45.22
CD (p< 0.05)		0.710	0.752	0.721	0.318	0.312	0.315

The increased yield was due to significantly more number of fruits plant^{-1} and fruit weight plant^{-1} respectively. The lowest yield and number of fruits plant^{-1} and fruit weight plant^{-1} was noticed with control. The higher value for yield could be attributed to quick release of nutrients in sufficient amount.

Table 5 Economics of production in chilli

	Cost involved on variable cost and fixed cost	Rs. ha^{-1}
A	Nursery raising/preparation/sowing management (10 labours @ Rs 150/labour)	1500.00
Total A		**1500.00**
	Preparatory tillage (3 ploughing @ Rs 3000.00)	9000.00
B	Clod breaking/levelling (20 labours@ Rs 150 per labour)	3000.00
	Preparation of beds / channels(35 labours@ Rs 150 per labour)	5250.00
	Planting of seedling(35 labours@ Rs 150 per labour)	5250.00
C	Irrigation(15 labours@ Rs 150 per labour)	2250.00
D	Cultural operations(3 hand weeding/hoeing 40 labours@ Rs 150 per labour)	6000.0
E	After care operations(10 labours@ Rs 150 per labour)	1500.00
F	Picking, harvesting and drying (25 labours@ Rs 150 per labour)	3750.00
Total (C+D+E+F)		13500.00
Total (A+B+C+D+E+F)		33750.00
	Incidental charges at 5% 0f working capital	1687.50
	Total labour component involved in cost of cultivation	35437.50
G	Cost of seed at 1000 kg^{-1} for 2 kg seed ha^{-1}	2000.00
Total G		**2000.00**
	Variable cost	37437.50
	Land rent at Rs 900 kanal^{-1}	18000.00
	Land tax	80.00
	Deprecation on implements	800.00
Total		**18880.00**
	Interest at 8.5% on fixed factor	1604.80
Total fixed cost (18880+1227.20)		**20484.80**

Table 6 Treatment wise comparative economics of cost of cultivation of chilli (hectare basis)

Symbols	Treatments	Fixed Cost (Rs. ha^{-1})	Variable cost (Rs. ha^{-1})	Total cost of cultivation (Rs. ha^{-1})	Pooled dry fruit yield (q ha^{-1})	Gross Returns (Rs. ha^{-1} @ Rs 80.00 kg^{-1})	Net returns (Rs. ha^{-1})	Return per rupees
T_1	Control	20484.80	43421.50	63906.30	26.12	169780.00	105873.70	2.66
T_2	Farm Yard Manure @ 25 t ha^{-1}	20484.80	49937.50	70422.30	31.27	203255.00	132832.70	2.89
T_3	Sheep Manure @ 20 t ha^{-1}	20484.80	53437.50	73922.30	34.25	222625.00	148702.70	3.01
T_4	Poultry manure @ 6 t ha^{-1}	20484.80	49437.50	69922.30	35.25	229125.00	159202.70	3.28
T_5	Vermicompost @ 5 t ha^{-1}	20484.80	52437.50	72922.30	33.22	215930.00	143007.70	2.96
T_6	RFD (50%) + Farmyard Manure (100%)	20484.80	52929.50	73414.30	39.65	257725.00	184310.70	3.51
T_7	RFD 50% + Sheep Manure (100%)	20484.80	56429.50	76914.30	41.23	267995.00	191080.70	3.48
T_8	RFD 50%+ Poultry manure (100%)	20484.80	52429.50	72914.30	42.81	278265.00	205350.70	3.82
T_9	RFD 50% + Vermicompost (100%)	20484.80	55429.50	75914.30	40.25	261625.00	185710.70	3.45
T_{10}	RFD 50% + Biofertilizers (100%)	20484.80	40629.50	61114.30	37.22	241930.00	180815.70	3.96
T_{11}	RFD 50% +FYM+SM+PM+VC+BF (100%)	20484.80	96129.50	116614.30	43.32	281580.00	164965.70	2.41
T_{12}	RFD (75%) + Farm Yard Manure (100%)	20484.80	54370.30	74855.10	44.24	287560.00	212704.90	3.84
T_{13}	RFD (75%) + Sheep Manure (100%)	20484.80	57870.30	78355.10	47.22	306930.00	228574.90	3.92
T_{14}	RFD (75%) + Poultry manure (100%)	20484.80	53870.30	74355.10	48.25	313625.00	239269.90	4.22
T_{15}	RFD (75%) + Vermicompost (100%)	20484.80	56870.30	77355.10	46.25	300625.00	223269.90	3.89
T_{16}	RFD (75%) + Biofertilizers (100%)	20484.80	42070.30	62555.10	42.12	273780.00	211224.90	4.38
T_{17}	RFD (75%) + FYM (50%) + SM (50%) + PM (50%) + VC (50%) + BF (100%)	20484.80	69720.30	90205.10	55.65	361725.00	271519.90	4.01
T_{18}	Recommended fertilizer dose(120 :80:60 kg ha^{-1})	20484.80	37437.50	57922.30	45.22	293930.00	236007.70	5.07

The results showed the significant statistical significance as shown in tables. These results obtained in present study are in line with those of Abusaleha and Shanmugavelu, K.G. 1988, Amirthalingam, S.1988 and Chattoo *et al* 2009 [11-13,]. Among the treatments significantly the lowest yield was observed in control. Similar increase in fruit yield was observed in gangetic alluvial plain soils with 50% nitrogen received from vermicompost and 50% from urea [14].

The reasons for increased fruit yield in chilli was attributed to the increased solubilization effect and availability of nutrients by the addition of FYM and increased physiological activity leading to the build-up of sufficient food reserves for the developing sinks and better portioning towards the developing fruits. Similar results were also reported by Subbaiah *et al*. in Chilli [15].

Economics

During two years of investigation significantly higher net returns (345672.40 ha-1) and BC ratio (4.47) was obtained with combined application of RFD 75% + Farmyard manure + Sheep manure + Poultry manure + Vermicompost + Biofertilizers (**Tables 5** and **6**).

However, lowest net returns of Rs. 152701.60 with returns of 2.40 per rupee were observed in control. It can be perceived that optimization of resources and managerial skills are vital tools in profitable cultivation of chilli.

Conclusion

Combined application of RFD 75% + Farmyard manure + Sheep manure + Poultry manure + Vermi-compost + Bio-fertilizers was economical to get higher red ripe, dry chilli yield, net returns and BC ratio.

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Reference

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