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Performance of organic leafy vegetables production under Hyderabad conditions

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Organically grown foods taste better and contain a better balance of vitamins and minerals than conventionally grown foods. Leafy vegetables place a vital role in daily diet of humans with high nutritional values. Leafy vegetables are rich source of vitamins, minerals and dietary fibre .They contribute 80-100 g per day per person in daily diet which is 40% of the daily total vegetable consumption per day per person. As leafy vegetables are of short duration and remunerative, farmers use huge amount of nitrogenous fertilizers for quick and luxurious growth which leads to poor quality and also ends up in ground waters contamination. If these greens are cultivated totally with high dose of chemical fertilizers, growth and yields are high but quality of the greens will be reduced drastically. Growing of leafy vegetables under organic conditions not only improves the quality but also extends the shelf life. The increased use of organic inputs in the production of agricultural and horticultural crops is - helpful not only for human health but also for plant and soil health.

Field investigations were carried out for three consecutive *kharif* seasons (2009-11) for amaranthus and three *rabi* seasons for palak (2009-11) at Vegetable Research Station, ARI, Rajendranagar (17^0. 33N latitude, 78.40^0 E longitude and 536 M altitude) in a factorial randomized block design (FRBD) replicated thrice with two varieties as main factors and seven treatments as sub factors. The seeds were sown with a spacing of 30 x 5 cm under irrigated black soil. For plant protection, only neem oil was used. The treatments imposed are seven, recommended dose of chemical fertilizers and three different organics vermicompost, FYM and neem cake and three organics in combination with PSB and Azospirillum biofertilizers. Oxalates were estimated in fresh leaf by using titrimetric method adescribed by Bassett *et al.,* (1978).

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Leaf yield of amaranthus and palak varied significantly due to application of different organic manures and inorganic fertilizers (Table 1). Palak recorded two folds higher yield to amaranthus because in amaranthus only two cuts were taken where as in palak five cuts -were taken. In both the crops in first harvest, application of recommended dose of inorganic fertilizer - recorded higher yield while in subsequent cuts and total mean yield of all cuts, organic treatments recorded higher yield, as organics stimulate microbial activity greatly and increased rate of mineralization provides continuous nutrient supply. These findings are in agreement with those of Abdullad Adil Ansari and Kumar Sukhraj (2008).

In case of amaranthus, among the two varieties, Arka Suguna recorded significantly higher yield, where as in palak All green variety recorded significantly higher yield.

In amaranthus, application of FYM @ 20 t ha^{-1} + PSB + Azospirillum each @ 5kg ha^{-1} recorded significantly higher leaf yield than all other treatments where as in palak FYM @ 20 t ha^{-1} and neem cake @ 2 t ha^{-1} + PSB + Azospirillum each @ 5 kg ha^{-1} recorded comparable yield. Organic manures in combination with biofertilizers recorded higher yields as compared to organic manures alone. In both the crops recommended dose of chemical fertilizers recordedsignificantly higher yield as compared to application of vermi compost @ 5 t ha^{-1} alone. All the three organics applied in combination with biofertilizers increased the leaf yields of amaranthus and palak more or less equally upto 11%. Application of organics attributed to better growth of plants and higher yields by slow release of nutrients for absorption with additional production of plant growth promoting substances like giberellin, cytokinin and auxins. These research results are in line with Abdullah Adil Ansari (2008), Vennila and Jayanthi (2010).

The benefit cost ratio of amaranthus and palak varied highly. In amaranthus 100% RDF treatment and FYM @ 20 t ha^{-1} in combination with biofertilizers recorded higher B:C ratio of 1:0.68,and were on par while in palak,

Table 1: Yield and economics of leafy vegetables as influenced by organics and biofertilizers,pooled data of three years (2009-2011)

Treatments	Pooled data of three years							
	Amaranthus				Palak			
	RNA-I	Arka suguna	Mean	B:C ratio	All green	Arka anupam	Mean	B:C ratio
T_1 – 100% RDF (100-50-50 kg ha^{-1}) of N, P_2O_5 & K_2O	95.3	95.6	95.5	0.68	313	322	317	3.13
T_2 – Vermi compost 5 t ha^{-1}	85.0	83.0	84.0	0.12	316	268	292	2.07
T_3 – FYM 20 t ha^{-1}	94.0	103.0	98.5	0.47	309	292	300	2.44
T_4 –Neem cake 2 t ha^{-1}	91.6	109.3	100.5	0.11	304	299	301	1.73
T_5 –Vermi compost 5 t ha^{-1} + PSB + Azospirillum @ 5kg each ha^{-1}	97.6	103.6	100.6	0.32	347	284	315	2.28
T_6 –FYM 20 t ha^{-1} + PSB + Azospirillum @ 5kg each ha^{-1}	115.6	114.0	114.8	0.68	350	317	334	2.79
T_7 –Neem cake 2 t ha^{-1} + PSB + Azospirillum @ 5kg each ha^{-1}	102.0	106.3	104.1	0.14	341	324	332	1.99
Mean	97.3	102.0	-	-	325	300	-	-
	SEm±	C.D @ 5%	CV %		SEm±	C.D @ 5%	CV %	
M	0.85	2.49	15%		1.2	3.6	10.1	
S	1.60	4.65			2.3	6.7		
M x S	2.26	7.83			3.2	11.2		

Table 2: Oxalate content (mg/100 gm of fresh weight) of amaranthus and palak in organic production.

Treatments	Amaranthus			Palak		
	RNA-I	Arka suguna	Mean	All green	Arka anupam	Mean
T_1 – 100% RDF (100-50-50 kg ha^{-1}) of N, P_2O_5 & K_2O	78.4	98.1	88.2	609	562	585
T_2 – Vermi compost 5 t ha^{-1}	82.9	83.3	83.1	596	573	584
T_3 – FYM 20 t ha^{-1}	82.0	80.5	81.2	515	546	581
T_4 –Neem cake 2 t ha^{-1}	81.2	77.4	79.3	605	551	578
T_5 –Vermi compost 5 t ha^{-1} + PSB + Azospirillum @ 5kg each ha^{-1}	76.0	77.1	76.6	576	576	576
T_6 –FYM 20 t ha^{-1} + PSB + Azospirillum @ 5kg each ha^{-1}	70.5	80.6	75.6	550	590	570
T_7 –Neem cake 2 t ha^{-1} + PSB + Azospirillum @ 5kg each ha^{-1}	75.4	70.7	73.0	540	526	533
Mean	78.0	81.1	-	584	560	-
	SEm±	C.D @ 5%	CV %	SEm±	C.D @ 5%	CV %
M	0.17	0.5	1%	1.5	4.4	8.4
S	0.32	0.94		2.8	8.3	
M x S	0.46	1.58		4.0	13.9	

recommended dose of chemical fertilizer recorded higher B:C ratio of 1:3.13.

Use of organics in cultivation of leafy vegetables had a significant influence on the quality of fresh leaf in terms of oxalate content. Oxalate content in amaranthus was found to be 73-88 mg/100 g of fresh leaf while in palak oxalate content ranged from 533 to 585 mg/100 g of fresh leaf. In amaranthus among the two varieties RNA-1 recorded significantly lower oxalates while in palak Arka Suguna recorded significantly lower oxalates. Among the treatments, in the both crops, (Amaranthus and palak) application of neem cake @ 2 t ha^{-1} in combination with PSB + azospirillum @ 5 kg ha^{-1} each recorded significantly lower oxalate content as compared to all other treatments. In amaranthus, appplication of recommended dose of inorganic fertilizers recorded significantly higher amount of oxalates while in palak RDF treatment and all the organic treatments except neem cake application @ 2 t ha^{-1} with biofertilizer recorded comparable oxalate content in fresh leaf.

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