International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2020; 8(1): 287-291

Received: 18-11-2019
Accepted: 20-12-2019

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Effect of integrated use of organic and inorganic sources of nutrients on nectarine crop cv. *Silver king* under temperate condition

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Abstract
An experiment was conducted during 2012-2013 to assess the effect of different treatments of organic and inorganic fertilizers on soil properties, fruit quality and yield in Nectarine cv. 'Silver King'. Different organic and inorganic sources of nutrients significantly increased the soil nutrient status in soil. The organic carbon significantly increased by T5, T4, T6, T2, T7, T3, T2 than to T1 treatment. The total soluble solids were highest in T5 followed by T4, T3, T6, T7, T2 and lowest in T1. The fruit yield significantly increased by 1.17, 1.13, 1.11, 1.08, 1.03 and 1.02 times for the T5, T4, T3, T2, T6 and T7 compared with the treatment T1. It is concluded that T5-50%NPK+25%FYM+25%VC are more effective for fruit yield and improving the nectarine production in temperate areas. However, treatment T5 is more effective than T4 and T3. Among combination of organic and inorganic fertiliser is more effective than alone nutrient resources.

Keywords: Available nutrients, total soluble solids, fruit yield, nectarine and fruit quality

1. Introduction
Nectarine (*Prunus persica* var. *nucipersica*) belongs to the Rosaceae family and have introduced crop in Bhaderwah, district Doda in union territory of Jammu and Kashmir, India. It has apparently originated from peach by alteration and the lack of pubescence is controlled by a single recessive gene. Usually, nectarine is smaller than peach, has more red blush than peach, slightly acidic and sour whereas peach is extremely juicy and sweet. The rich winy flavor and supreme aroma of nectarine is more distinct compared to peach. The peach and nectarine plants resemble with each other and it is very difficult to distinguish a peach tree from a nectarine tree, except the surface of the fruit skin which is smooth and fuzz less in nectarine. Nectarines are believed to have originated from peach by mutation and the smooth skinned fruit in nectarines is governed by the presence of single recessive gene where as in peaches fuzzy skin is due to a dominant gene. Peach is the third most important temperate fruit crop of India and in Jammu and Kashmir, the area under peach cultivation corresponds to 2523 hectares with an annual production of 5472 Metric tonnes (Anonymous, 2018) [2].
The area is increasing, while per acre production is decreasing in spite of the best climate. The reasons for poor production and early decline of the orchard may be, several but improper and imbalanced nutrition may be one of the important issues. Per unit area production of deciduous fruit in NPK province is low than to other deciduous fruit rising areas of the world. The main cause for the poor production and early decline of young fruit orchard may be several but improper and imbalanced nutrients are the major one. The soil of NPK is deficient in organic matter, nitrogen, phosphorus and zinc (Idris *et al*., 2002) [8]. To beat the problem of nutrient deficiency and to increase orchard yield, the farmers apply organic and inorganic fertilizer. However, the chemical fertilizers are luxurious and most of the farmers cannot afford to use these fertilizers in appropriate amount and balanced proportion which results in low production than the potentially demonstrated yield and low fertilizer use efficiency (Ahmad, 2000) [1]. In the other hand farmer made in home organic product and increase the income of fruit orchard. The essential ambition of integrated plant nutrition system is the maintenance of soil fertility to an optimum level for sustaining the desired crop productivity by optimizing the benefits from all possible sources of plant nutrients. Organic material also promotes the biological activities as it provides carbon as an energy source to N-fixing bacteria. It enhances

seed germination, root initiation, growth, yield and nutrient uptake and thus fertilizer and water use efficiency (Idris *et al*., 2002) [8]. A judicious use of organic manures and bio fertilizers might be effective not only in sustaining crop productivity and in soil health, but also in supplementing chemical fertilizers of the crops (Jaipaul *et al.*, 2011) [9].

Integrated nutrient management (INM) originate to be beneficial for preservation of soil fertility and plant nutrient supply to an optimum level, for nourishing desired crop productivity through optimization of benefits from all possible sources of plant nutrients in an integrated manner. The basic principle of INM is the maintenance of soil fertility, sustainable agricultural productivity and improving farmers profitability through judicious and efficient use of chemical fertilizers and organic manure etc (Bhalerao *et al.*, 2009) [5]. The aim of present study was to study the response of nectarine cultivar to organic and inorganic source of fertilizes as well as combination of these. As fertilization of nectraine trees exerts a significant role on fruit yield as well as on fruit quality, this study help us in evaluating the suitable combination of organic and inorganic fertilizers.

2. Material and methods

2.1. Study site description

The experiment was conducted at Regional Horticultural Research Sub-station, Bhaderwah, Sher-e- Kashmir University of Agricultural Sciences and Technology Jammu. The experiment is situated at an elevation of 1600 m above mean sea level and lies between 32^0 53' and 34^0 21' latitude and 75^0 01' and 76^0 47' E longitudes. The climate of experiment site is sub humid temperate region, rainfall limited mainly to winter months. The months of January and February months are snowfall also knowledgeable.

2.2. Soil analysis and fruit quality parameters

The research was conducted during a period of 2 years (from 5^{th} year to 6^{th} year) in 4 years old plants in high density of nectarine cultivars 'Silver King' which were spacing of 4m x 4m these plants were treated with different organic and inorganic fertilizer at Regional Horticultural Research Sub-station, Bhaderwah, Sher-e- Kashmir University of Agricultural Sciences and Technology Jammu during 2011 and 2013. The experiment was laid out in a randomized block design with 7 treatments and four replications. The treatments comprised of T_1: control, T_2:100% NPK through inorganic sources of fertilizers, T_3:50% NPK through inorganic fertilizers + 50% NPK through farmyard manure, T_4:50% NPK+ 50% vermicompost, T_5: 50% NPK+ 25% FYM + 25% vermicompost, T_6:100% vermicompost and T_7:100%FYM. Horticultural operations were carried out as per standard practices under temperate conditions. The surface (0-15 cm) soil samples were analyzed for the properties i.e. soil reaction by pH metre, EC by EC metre, Organic carbon in soil was determined by Walkley and Black's rapid titration methods as suggested by Piper (1966) [13]. Available N was estimated by using alkaline KMnO4 method as suggested by Subbiah and Asija, (1956) [16]. Available P content of the soil was extracted with Sodium bicarbonate by Olsen *et al.*, (1954) [11]. Available potassium was determined in the neutral normal ammonium acetate extract of soil through Flame photometer. The observation regarding fruit size (length and diameter), weight and total soluble solid (TSS) of fruits was estimated based on random for five fruit samples.

2.3. Statistical analysis

The significance of soil properties, available nutrients and fruit quality parameters was calculated by randomized block design (RBD) with the help of SPSS 16.0.

3. Results and Discussion

3.1. Soil properties

The data presented in table-1 shows that the soil pH was highest in T5 treatment and was lowest in treatment T1 in both the year and pool data. The difference among the treatment was significant (P = 0.05). The electrical conductivity was highest in T2 and the lowest in T6 treatment, the difference was non-significant. The organic carbon content was highest in treatment T5 followed by T4, T3, T6, T7, T2 and was lowest in T1. Application of various treatments in integration significantly influenced the soil properties of soil i.e. pH, electrical conductivity and organic carbon content In general organic sources have tendency to keep the soil pH in slightly neutral range. However, a slight increase in pH towards 7 was noticed with the application of vermicompost in apricot (Archina, 2008) [3]. Different workers have reported increase in soil pH with vermicompost application (Chaudhary *et al.*, 2004) [6]. The organic fertilizers have moderating effect on soil fertility. Slight increase in soil pH in tree basin could be ascribed to added organic matter to soil and proton release resulting in accumulation of organic anions such as malate, citrate and oxalate in plants. The electrical conductivity (EC) of the soil decreased with the application of increasing doses of organic and inorganic sources. Singh *et al.* (2010) [15] also recorded slightly increase in soil electrical conductivity with the application of vermicompost +NPK + FYM. The improvement in organic carbon content with the application of organic and inorganic fertilizer which might be attributed to increased organic matter status of the soil and improved soil structure. Singh (2007) [14] reported that the soil quality in terms of physical properties increased upto 60 per cent by integrated nutrient management practices.

Table 1: Effect of integrated use of organic and inorganic sources on soil properties of nectarine crop

Treatments	pH (1:2.5)			Electricity conductivity (dSm^{-1})			Organic carbon ($g\ kg^{-1}$)		
	2012	2013	Pool	2012	2013	Pool	2012	2013	Pool
T1- Control	5.45	5.58	5.51	0.125	0.126	0.125	4.52	4.62	4.57
T2 -(100%NPK)	5.80	5.90	5.85	0.150	0.141	0.146	4.70	4.90	4.80
T3-(50% NPK+50%FYM)	5.50	5.70	5.60	0.135	0.137	0.136	5.20	5.50	5.35
T4-(50%NPK+50%VC)	5.70	5.80	5.75	0.132	0.136	0.134	6.40	6.70	6.55
T5-(50%NPK+25% FYM+25% VC)	5.90	6.10	6.00	0.142	0.144	0.143	6.80	6.90	6.85
T6- (100%VC)	5.5	5.6	5.55	0.131	0.132	0.132	5.90	6.10	6.00
T7- (100%FYM)	5.80	5.90	5.85	0.130	0.131	0.131	5.70	6.00	5.85
SEm±	0.18	0.16	0.17	0.010	0.010	0.01	0.03	0.04	0.04
CD(p=0.05)	0.51	0.48	0.50	NS	NS	NS	0.09	0.12	0.11

3.2. Available nutrients (N, P and K)

Results showed that the significantly (P=0.05) effect of different organic and inorganic nutrient resources available nutrients content (Table 2.). The available nitrogen content was T5,T4, T6, T7, T3, and T2 for the 21.8, 17.2, 16.5, 15.2, 11.3 and 6.7 percent higher as compared to those in control, respectively. The available phosphorous was highest in T5 followed by T4, T2, T3, T6 T7 and T1 treatment. The available potassium content was significantly higher in treatment T5 followed by T4, T3, T2, T6 and T7. Combination applications of different doses of organic and inorganic nutrient sources have resulted in a immediate increase in available macro-nutrients. The increase in available N content of soil with chemical fertilizers might be due to increased storehouse of N after it is mineralized. Singh et al., (2010) [15] found that the conjoint application of organics and chemical fertilizers for apricot enhanced available N content in soil thereby improving soil health. The increased availability of N due to application of bio-organics could be attributed to the greater multiplication of microbes which converted organically bound N to inorganic form (Archna, 2008) [3]. The available soil phosphorus content increased significantly when applied in combination with organic and inorganic fertilizer. This might be due more solubilisation of insoluble phosphate in the soil with it easily available to the plants. The maximum build-up of available N was record with organic and inorganic as well as biofertilizers that the synergism resulted in better N fixation and increased availability of P, that might have facilitated the supply of ATP energy which have been used by free-living bacteria for enhancing the biological nitrogen fixation (Singh *et al*., 2010) [15]. The increase in N, P and K uptake owing to organic manures lies in the fact that apart from supply of nutrients, it enhanced the availability of these nutrients to the plant. It also improved the soil environment, which encourages proliferation of system resulting in higher biomass production and sustainable soil health management. The beneficial effect of organic and inorganic manures on K might be due to the lessening in potassium fixation and release of potassium due to interaction of organic matter.

Table 2: Effect of integrated use of organic and inorganic sources on available nutrients in soil of nectarine crop

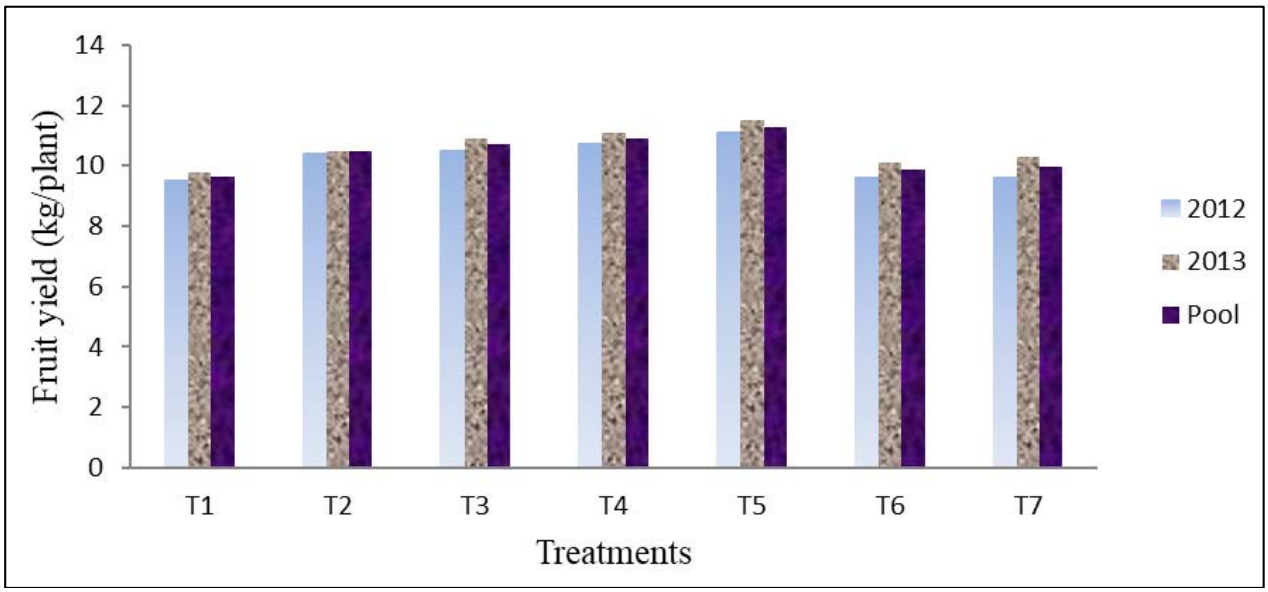
Treatments	Available N (kg ha^{-1})			Available P (kg ha^{-1})			Available K (kg ha^{-1})		
	2012	2013	Pool	2012	2013	Pool	2012	2013	Pool
T1- Control	264.00	268.00	266.00	13.00	14.00	13.50	165.00	167.00	166.00
T2 -(100%NPK)	281.00	287.00	284.00	16.00	17.00	16.50	182.00	184.00	183.00
T3-(50% NPK+50%FYM)	308.00	314.00	309.00	15.00	16.00	15.50	194.00	196.00	195.00
T4-(50%NPK+50%VC)	310.00	314.00	312.00	17.00	18.00	17.50	206.00	210.00	208.00
T5-(50%NPK+25% FYM+25% VC)	320.00	328.00	324.00	18.00	19.00	18.50	214.00	219.00	216.50
T6- (100%VC)	295.00	297.00	296.00	14.00	15.00	14.50	178.00	175.00	176.50
T7- (100%FYM)	305.00	308.00	306.00	14.00	14.50	14.25	174.00	172.00	173.00
SEm±	1.92	2.14	2.03	0.42	0.46	0.44	1.06	1.08	1.07
CD(p=0.05)	5.76	6.39	6.08	1.26	1.37	1.32	3.19	3.24	3.22

3.3. Fruit yield

The fruit yield was influenced by organic and inorganic sources on nectarine crop (Fig. 1). The fruit yield was highest in T5 (50%NPK+25% FYM+25% VC) followed by T4, T3, T2, T6, T7 and was lowest in T1 treatment. The single nutrient sources showed lower response with respect to fruit yield compared to combination of organic and inorganic sources because the both sources released nutrients rapidly during the first and second year of application and the increase of nutrients. Instant availability of nutrients through inorganic fertilizers, along with organic manures ascribed to conducive physical environment that lead to higher nutrient absorption from the native as well as applied sources. This favoured highest nutrient uptake and ultimately resulted in higher yield, whereas, reverse is true with organic manures. The nitrogen containing organic compounds in organic manures especially in farmyard manure and vermicompost are more resistant to decomposition and only about one third of the nitrogen is without difficulty released. The remaining amount of nitrogen persisted in the soil for a long period. Bair *et al.* (2008) [4] reported that the higher remaining effect of green manuring might have increased the soil organic matter content and available nutrients, which in turn, favourably affected growth and yield attributes and ultimately the fruit yield in the subsequent year. Higher yields obtained with combined use of vermicompost and farmyard manure as well as green manure was possibly due to supply of balanced nutrition, congenial physical and biological soil environment (Deshpande and Senapathy, 2010) [7].

3.4. Fruit quality attributes

The fruit weight was highest in treatment T5 followed by T4, T3, T6, T7, T2 and lowest in T1 (Table 3). The fruit size (length and diameter) was highest in treatment T5 and lowest in T1. The total soluble solids (TSS) were 39.2. 26.3, 23.6, 15.5, 13.4 and 9.8 per cent form that of T5, T4, T3, T6, T7 as compared to T1. The improved fruit quality might be due to action of joint application of organic sources and inorganic fertilizers which might have acted complementary and supplementary to each other and resulted into adequate supply of nutrients (Pilania *et al.*, 2010) [12] and fruit size. Singh *et al.* (2010) [15] recorded the, TSS with the conjoint application of organic and inorganic nutrient sources for apricot.



T1- Control; T2 -(100%NPK); T3-(50%NPK+50%FYM); T4-(50%NPK+50%VC); T5-(50%NPK+ 25% FYM+25% VC); T6-(100%VC) and T7- (100%FYM).

Fig 1: Effect of integrated use of organic and inorganic sources on fruit yield of nectarine crop

Table 3: Effect of integrated use of organic and inorganic sources on fruit yield and quality attributes of nectarine crop

Treatments	Fruit weight (g)			Fruit length (mm)			Fruit diameter (mm)			TSS^0 brix		
	2012	2013	Pool	2012	2013	Pool	2012	2013	Pool	2012	2013	Pool
T1- Control	37.23	38.26	37.75	43.70	44.60	44.15	39.30	39.90	39.60	9.20	9.40	9.30
T2 -(100%NPK)	48.47	49.50	48.99	45.80	46.40	46.10	42.70	42.30	42.50	10.12	10.30	10.21
T3-(50%NPK+50%FYM)	52.13	53.20	52.67	47.90	48.50	48.20	42.50	43.20	42.85	11.40	11.60	11.50
T4-(50%NPK+50%VC)	54.48	55.52	55.00	48.60	49.90	49.25	42.80	43.60	43.20	11.70	11.80	11.75
T5-(50%NPK+ 25% FYM+25% VC)	59.19	60.30	59.75	50.40	51.10	50.75	44.50	45.10	44.80	12.80	13.10	12.95
T6- (100%VC)	51.52	52.74	52.13	47.50	48.20	47.85	41.40	42.09	41.75	10.60	10.90	10.75
T7- (100%FYM)	49.82	51.10	50.46	46.80	47.40	47.10	40.60	42.01	41.31	10.50	10.60	10.55
SEm±	1.25	1.27	1.26	0.10	0.11	0.11	0.08	0.09	0.09	0.12	0.14	0.13
CD(p=0.05)	3.65	3.74	3.70	0.29	0.32	0.31	0.22	0.25	0.24	0.35	0.42	0.39

4. Conclusions

The study reveals that organic and inorganic sources of nutrients are the best option for combination nutrients resources for improving soil property as well as available nutrients. The treatment T5- 50%NPK+ 25% FYM+25% VC was found to be most effective to produce better fruit quality in terms of TSS, fruit size. Therefore the organic and inorganic inputs may be used which were found to be helpful in enhancing quality of produce. Hence, the combination of organic and inorganic fertilizer improving sustainable soil health management and increasing fruit quality attributes of nectarine crop under temperate conditions.

5. References

1. Ahmad N. Fertilizer scenario in Pakistan: Policies and development In: Proceeding of conference Agric. and fertilizer use. 2010. Feb. 15-16, NFDC, Islamabad, 1999, 2000.
2. Anonymous. Statistical data. Department of Horticulture, Jammu and Kashmir, 2018
3. Archna Chauhan. Studies on integrated nutrient management in plum (Prunus salicina L.) cv. Santa Rosa. Ph.D. Thesis. Dr Y S Parmar, University of Horticulture and Forestry, Nauni, Solan, India, 2008, 104.
4. Bair KE, Davenport JR, Stevens RG. Release of available nitrogen after incorporation of a legume cover crop in Concord grape. Hort Science. 2008; 43(3):875-880.
5. Bhalerao VP, Patil NM, Badgujar CD, Patil DR. Studies on Integrated Nutrient Management for tissue culture Grand Naine banana. Indian Journal of Agriculture Research, 2009; 43(2):107-112.
6. Chaudhary AS, Sachan SK, Singh RL. Studies on the Effect of Organic Manures and Inorganic Fertilizers on Growth and Yield of Hybrid Capsicum (*Capsicum annuum* var. grossum L.). Indian Journal of Horticulture, 2004; 18(1, 2):147-149.
7. Deshpande HH, Senapathy P. Effect of green manuring and organic manures on yield, quality and economics of rice (*Oryza sativa* L.) under lowland condition. Karnataka Journal of Agricultural Science, 2010; 23(2):235-238.
8. Idris M, Iqbal MM, Shah SM, Mohammad W. The Integrated effect of mineral and organic nitrogen, and Azotobacterization on the yield and nitrogen nutrition of wheat. Pak. J Soil Sci. 2002; 21:36-42.
9. Jaipaul Sharma S, Dixit AK, Sharma AK. Growth and yield of capsicum (*Capsicum annum*) and garden pea (*Pisum sativum*) as influenced by organic manures and biofertilizers. Indian Journal of Agricultural Sciences. 2011; 81(7):637-642.
10. Khachi B, Sharma DS, Vikas G, Kumar P, Mir M. Study on comparative efficacy of bio-organic nutrients on plant growth, leaf nutrient contents and fruit quality attributes of kiwi fruit. Journal of Applied and Natural Science, 2015; 7(1):175-181.
11. Olsen SR, Cole CV, Watanabe FS, Dean LA. Estimation of available phosphorus by extraction with sodium bicarbonate. U.S.D.A. Circular. 1954; 939:19.

12. Pilania S, Shukla AK, Mahawer LN, Rajvir S, Bairwa HL. Standardization of pruning intensity and integrated nutrient management in meadow orcharding of guava (*Psidium guajava* L.). Indian Journal of Agricultural Sciences, 2010; 80(8):673-78.
13. Piper CS. Soil and Plant Analysis. Hans Publishers, Bombay,1966, 40-51.
14. Singh AK. Evaluation of soil quality under integrated nutrient management. Journal of the Indian Society of Soil Science. 2007; 55(1):58-61.
15. Singh VJ, Sharma SD, Kumar P, Bhardwaj SK, Raj H. Conjoint application of bio-organics and inorganic nutrient sources for Impriving cropping behavior, soil properties and quality attributes of apricot (*Prunus armeniaca* L). Indian Journal of Agricultural Sciences, 2010; 80(11):981-87.
16. Subbiah BV, Asija GL. A rapid procedure for the estimation of available nitrogen in the soil. Current Science. 1956; 25:259-260.