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## Studies on integrated nutrient management in nectarine crop cv. Snow queen

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#### Abstract

The present investigation entitled, Studies on Integrated Nutrient Management in Nectarine crop cv. Snow queen, was carried out during the years 2018 and 2019 in experimental field of SKUAST-K, Shalimar. The experiment was laid out in Randomized Block Design with two replications and two plants per replication. Four year old nectarine plants cultivar snow queen were planted at a distance of 4x4 m. Integrated Nutrient Management were found to have a significant effect on, average fruit yield which was higher in nectarine trees treated with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost (T3) followed by 75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T2) and lowest fruit yield was obtained with 25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T6). Fruit length, fruit diameter and fruit weight were found highest with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost (T3), however the fruits harvested from the trees treated with 25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T6) were found smaller in size than control. Average fruit firmness was found highest with treatment (T3) and lowest with treatment (T6). TSS, Titrable acidity and Total sugars were found highest with treatment (T3) 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost followed by 75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T2) and lowest fruit yield was obtained with 25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T6) treatment.

**Keywords:** Nectarine, integrated nutrient management, snow queen, yield, fruit quality

#### Introduction

India is having 2.27 per cent of the total land area, feeds more than 16 per cent of world population. Such a huge population magnifies the demand for more food from shrinking cultivated area which requires huge amount of fertilizers and other inputs. The chemical fertilizers have played a very significant role in intensive food production, which has brought many fold increase in production, but large scale use of chemical fertilizers causes problem of ground water and environmental pollution through leaching, volatilization, denitrification and wastage of nutrients. Indiscriminate use of chemicals contributed in loss of soil biological dynamism and productivity along with addition of salts to the soil. To revive the soil health an alternate source has become essential, so concept of biofertilizer came forward, which can be a good supplement for a chemical fertilizers. Biofertilizer or microbial inoculants plays a very significant role in improving soil fertility by fixing atmospheric nitrogen both in association with plant roots and without it, producing numerous plant growth regulators that protects plants from phytopathogens, improving soil structure and bio remediate the polluted soils by sequestering toxic heavy metal species They are environmental friendly playing a significant role in crop production. The integration of inorganic fertilizer with organic manures and biofertilizer can achieve the highest fruit yield with improved fruit quality and soil fertility status of fruit plants. The judicious use of inorganic inputs with biofertilizer is considered as the alternative source to meet the nutrient requirement of the crops. So keeping in view above points into consideration the present investigation was carried out at Shalimar Campus (SKUAST-K,) on "Studies on Integrated Nutrient Management in Nectarine Crop cv. Snow Queen."

#### Materials and Methods

##### Research location and climate

The investigations were carried out at the Experimental Farm of Division of Fruit Science, SKUAST-Kashmir, during the years 2018 and 2019 on nectarine cv. Snow queen. Here the climate is temperate cum Mediterranean and of continental type. Winter is severe extending over 100 days from the middle of December to March, during which the temperature often

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goes below the freezing point and the whole valley remains covered with snow. The valley is marked by extreme of temperature, ranging from a maximum of 35°C in summer to a minimum of -10°C in winter. The annual mean temperature is 15°C. The climate is cold and rainfall is optimum, well distributed about 80 cm per annum, mostly in the form of snow during winter (Anonymous, 2018-19) [1]. So an experiment was laid out in a randomized block design with seven treatment combinations. There were two replications and 2 plants per replication.

### Yield and fruit characteristics

During these two years fruit yield was calculated by weighing all the fruits harvested individually from each experimental tree and average yield was expressed as kg/tree. Data on yield parameters were recorded as percent fruit set and fruit retention of each experimental plot calculated at fruit let stage by using the formula suggested by Westwood (1993) [10]. Fruit length and fruit diameter were measured by vernier caliper and fruit firmness was measured with pressure penetrometer. Fruit weight was determined by individually weighing the fruits obtained from each experimental plant on a common monopan balance and the average weight was recorded by using the procedure given by Rangana (1986). SSC was measured with the help of Zeiss hand refractometer. Titrable acidity was determined by titration method and values were expressed as percentage of malic acid (Rangana, 1986). Total sugars were determined by Lane and Eynan method (A.O.A.C., 1984). The data obtained was subjected to the statistical analysis in S-plus software.



Fig 1: Flowering and Fruiting of Nectarine CV Snow Queen

## Results and Discussion

### Fruit Yield and Fruit characteristics

Data on yield parameters like per cent fruit set, fruit retention, and fruit yield was found higher in nectarine trees treated with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost (T3) followed by 75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T2) and lowest yield parameters were obtained with 25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T6). Fruit length and fruit diameter were found highest with treatment (T3) 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost and lowest with (T6) 25ml PSB+25 ml VAM+1.5kg/tree vermicompost. Fruit weight was found lowest with (T6) treatment while highest was found with treatment (T3). Average fruit firmness was found highest with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost (T3) followed by 75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T2) and lowest was obtained with 25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T6). Chemical characteristics of nectarine fruits like TSS, Titrable acidity

and Total sugars were found highest with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost (T3) and lowest with 25ml PSB+25 ml VAM+1.5kg/tree vermicompost (T6).

## Discussion

### Flowering parameters

#### Percent fruit set and fruit retention

Percent fruit set and fruit retention was recorded maximum in T<sub>3</sub> (with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost) and minimum was noticed in T<sub>6</sub> (25 ml VAM+1.5kg/tree vermicompost). These results are in line with Goswami *et al.* (2015) who reported that maximum fruit set was found in rainy season of Guava (83.33%) than winter crop (34.32% as Guava under this experiment was treated with the application of 225 g N<sub>2</sub>O, 195 g P<sub>2</sub>O<sub>5</sub> and 150 g K<sub>2</sub>O along with 50 kg FYM enriched with 250g *Azospirillum per tree per year.*

**Treatment T<sub>3</sub>:** 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost.



Fig 2: Treatment (T3)

### Control



Fig 3: Control, Treatment (T1)

### Yield Parameter

Fruit yield was recorded maximum in T<sub>3</sub> (with 75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost) and minimum was recorded in T<sub>6</sub> (25 ml VAM+1.5kg/tree vermicompost). This might be due to better nutrient availability in T<sub>3</sub> which in turn increased the flower primordial, carbohydrates and nutrients essential to promote flowering and fruit retention in plants which ultimately lead to increase in nectarine fruit yield. These results are in line with Thakur and Thakur (2014) and Singh *et al.* (2012) who reported maximum fruit yield per plant of Aonla with the standard doze of NPK + FYM and with the integrated nutrient management of Plum.

### Physical parameters

Yield attributes of fruit viz; fruit length, fruit diameter and fruit weight were recorded maximum by the application of treatment T<sub>3</sub> with (75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost) and minimum was recorded in T<sub>6</sub> (25 ml VAM+1.5kg/tree vermicompost). These results are in congruence with Sharma *et al.*, (2008)<sup>[11]</sup>.

Maximum fruit firmness (8.91 kg/cm<sup>2</sup>) was recorded in T<sub>6</sub> (25 ml VAM+1.5kg/tree vermicompost). while lowest firmness ( 8.36kg/cm<sup>2</sup>) was observed in T<sub>3</sub> (75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost). Larger fruits tend to be softer than smaller fruits. This influence of size on firmness is generally thought to be a consequence of differences in cell expansion. Large fruits tend to have large cell size thus large cell vacuole exhibits less cell to cell contact and more air spaces. Both larger cells and air spaces provide more stress to cell walls resulting in less firm fruits. Stern (2008)<sup>[12]</sup> supported the findings that firmness is less in large fruits because of loss of cell to cell adhesion. These results are in line with Singh *et al.*, 2008 and Mandeep *et al.*, 2013<sup>[8]</sup>.



Fig 4: Treatment (T3)

75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost



Fig 5: Treatment (T2)

75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost



Fig 6: Treatment (T5)

50% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost



Fig 7: Control, Treatment (T1)

### Control

#### Chemical parameters

##### Soluble Solids Content

Maximum SSC (11.84%) was recorded in T<sub>3</sub> and minimum was observed in T<sub>7</sub> (10.17%). The improvement in fruit TSS is because of balanced and enhanced supply of macro and micro nutrients. Increased SSC could be due to beneficial effect on total leaf area of the plant which reflected in more carbohydrates production through photosynthesis process. These results are in conformity with. Fawzi *et al.*, (2010)<sup>[3]</sup> who reported that organic and biological nitrogen fertilization have given the highest TSS, total sugars, reducing and non-reducing sugars content and lowest acidity in Pear cv Le-conte.

##### Total sugars

Maximum total sugars (9.16%) was recorded in T<sub>3</sub>(75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost) treatment, while minimum total sugars (8.14%) was recorded in fruits harvested from trees under T<sub>6</sub> (25 ml VAM+1.5kg/tree vermicompost) treatment. Increased total sugars content may be due to increased rate of absorption of macro and micro nutrients available in balanced dose and also application of vermicompost which may have exerted regulatory role as an important factor in affecting the quality of fruits. *Azotobacter* and PSB inoculation also resulted in overall increase in fruit quality which can be explained in a way that *Azotobacter* and PSB contribute up to 20-30% N and 25-50% P<sub>2</sub>O<sub>5</sub> in soil, respectively. These results are in congruence with Mandeep *et al.*, 2013<sup>[8]</sup>.

##### Acidity

Maximum total acidity (0.64%) was recorded in treatment T<sub>6</sub>, while minimum total acidity (0.52%) was recorded in fruits harvested from trees under T<sub>3</sub> treatment. The reduction in acidity might be due to more accumulation of sugars in the fruit. Similar results were obtained by Mustafa *et al.* (2004)<sup>[9]</sup> in banana and Sharma *et al.* (2008)<sup>[11]</sup> in pomegranate.

### Conclusion

Thus from the present study, it may be concluded that application of Treatment T<sub>3</sub> 75% NPK+50 ml PSB+50gVAM+3kg/tree vermicompost was found superior than the other treatments with respect to improvement in important attributes contributing towards the better fruit tree yield and physical quality of fruit. As far as chemical quality of fruit was concerned, the same treatment proved most effective.

**Table 1:** Effect of integrated nutrient management on Percent fruit set (%), fruit retention (%) and yield of nectarine cv. Snow Queen during 2017 and 2018

Treatments	Percent fruit set (%)		Fruit Retention (%)		Yield (kg/Plant)	
	2017	2018	2017	2018	2017	2018
T1	Control (100% NPK)					
T2	75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost					
T3	75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost					
T4	50% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost					
T5	50% NPK+50ml PSB+50 ml VAM+3kg/tree vermicompost					
T6	25ml PSB+25 ml VAM+1.5kg/tree vermicompost					
T7	50ml PSB+50 ml VAM+3kg/tree vermicompost					
CD (p ≤0.05)						

**Table 2:** Effect of integrated nutrient management on fruit length (cm), fruit breadth (cm), fruit weight (gm) and fruit firmness (Kg/cm<sup>2</sup>) of nectarine cv. Snow Queen during 2017 and 2018

Treatments	Fruit Length (cm)		Fruit Breadth (cm)		Fruit Weight (gm)		Fruit Firmness (Kg/cm <sup>2</sup> )	
	2017	2018	2017	2018	2017	2018	2017	2018
T1	Control (100% NPK)							
T2	75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost							
T3	75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost							
T4	50% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost							
T5	50% NPK+50ml PSB+50 ml VAM+3kg/tree vermicompost							
T6	25ml PSB+25 ml VAM+1.5kg/tree vermicompost							
T7	50ml PSB+50 ml VAM+3kg/tree vermicompost							
CD (p ≤0.05)								

**Table 3:** Effect of integrated nutrient management on soluble solids concentration, SSC (%), Titrable Acidity (%), SSC/Acidity Ratio and Total Sugars (%) of nectarine cv. Snow Queen during 2017 and 2018

Treatments	Soluble solids concentration, SSC (%)		Titrable Acidity (%)		SSC/Acidity Ratio		Total Sugars (%)	
	2017	2018	2017	2018	2017	2018	2017	2018
T1	Control (100% NPK)							
T2	75% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost							
T3	75% NPK+50 ml PSB+50 ml VAM+3kg/tree vermicompost							
T4	50% NPK+25ml PSB+25 ml VAM+1.5kg/tree vermicompost							
T5	50% NPK+50ml PSB+50 ml VAM+3kg/tree vermicompost							
T6	25ml PSB+25 ml VAM+1.5kg/tree vermicompost							
T7	50ml PSB+50 ml VAM+3kg/tree vermicompost							
CD (p ≤0.05)								

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