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S Krishnakumar

Assistant Professor, Krishi
Vigyan Kendra, Agricultural
College and Research Institute,
Madurai, Tamil Nadu, India

R Arunkumar

Associate Professor and Head,
Coconut Research Station,
Veppankulam, Tamil Nadu,
India

J Selvi

Assistant Professor, Krishi
Vigyan Kendra, Agricultural
College and Research Institute,
Madurai, Tamil Nadu, India

M Jegadeesan

Assistant Professor, Krishi
Vigyan Kendra,
Ramanathapuram, Tamil Nadu,
India

E Subramanian

Programme Coordinator, Krishi
Vigyan Kendra, Agricultural
College and Research Institute,
Madurai, Tamil Nadu, India

Corresponding Author:

S Krishnakumar

Assistant Professor, Krishi
Vigyan Kendra, Agricultural
College and Research Institute,
Madurai, Tamil Nadu, India

Assessment of growth regulators on offseason flowering in Moringa var. Jaffna

S Krishnakumar, R Arunkumar, J Selvi, M Jegadeesan and E Subramanian

Abstract

The present study investigate the assessment of growth regulators on offseason flowering in Moringa var. Jaffna. The treatments viz., T₁ – Farm Yard Manure @ 2 t/acre/year; T₂–July pruning + 0.5% Nitrobenzene (Boom flower); T₃- July pruning + MC @ 50 ppm (Chamatkar) are assessed in this research paper. T₁ recorded higher number of pods *i.e.* 221 and lower in T₃ (181.8). T₁ recorded higher than the mean value of 198.33 pods per tree. The tree canopy ranged between 3.76 m T₂ to 4.38 m in T₁. The mean tree canopy spread was 3.97 m. The percent decrease over the farmers practice was 15.01% which might contribute to higher number of pods per tree. The TNAU technology of July pruning + 0.5% Nitrobenzene recorded the highest pod weight of 96.00 g and 23.07% percent above the farmers practice. The PAJANCOA & RI technology of July pruning + MC @ 50 ppm (Chamatkar) recorded the highest pod length of 96.60 cm and 17.08% percent above the farmers practice. The total yield per ha in farmers practice was 17.32, however the technologies T₂ recorded 18.45 t and T₃ was 15.63 t/ha. The percent increase over the farmers practice by T₂ was 6.50%, and also it was observed that the farmers practice out yielded the T₃ by 10.81%.

Keywords: *Moringa oleifera*, nitrobenzene, mepiquat chloride, yield, economics

Introduction

Moringa oleifera L. belongs to Moringaceae family and called as Miracle tree or tree of Life, because of its potential medical usage. It has the nutritional value and has a variety of uses (Marfori, 2010) ^[1]. The benefits of the moringa slowly realizing the farmers and it has been developed in cleaning of water in many countries (Oyeyinka and Oyeyinka) ^[2] Moringa is the prominent dryland crop of Madurai, Dindigul, Ramnad, Karur, Trichy districts of southern Tamil Nadu. In Madurai, it's chiefly grown in blocks viz., Kallikudi and Usilampatti. It is grown in both alluvial soil and red soil of Madurai district. The main season for Moringa is from April to June (Summer) and offseason is from December to February (Winter). The farmers prune only for leaf production. The peak flowering period starts from February and extends till April. During the main season the pod fetches from Rs.1.00 to 1.50 per pod *i.e.* Rs.15/kg. However, during off seasons the cost varies from Rs.100 to Rs.125 per kg. The major problems faced by the farmers during the main season are lower price, fluctuation and higher production. And during off season, the rain coincides with the flowering period that reduces the yield. Even during offseason, the number of rainy days coinciding with the flower production to be studied, since the cumulative yield per bush will have direct effect on marketable yield. This trait largely depends up the seasonal influence since, moringa need warm and dry climate during the flower production and fruit setting period.

Materials and Methods

For assessment of off season production in Moringa, ten year moringa plants were selected in five farmers' field (each one acre) at A. Krishnapuram village of Kallikudi block. The soil is chiefly black alluvial soil. The plants are grown in irrigated conditions at 3 x 3 m spacing and one plant per pit. The initial soil fertility status was 261: 15: 280. The total rainfall received in this area from July 2018 to February 2019 was 120 mm in 21 days. Pruning was done during July 2018, followed by imposing different treatments and flowering started from November and the produce was harvested during second fortnight of January 2019. The fertilizer viz., 200 g Ammonium sulphate, 100 g SSP & 50 g MOP was applied in two split doses except SSP. The fertilizers were applied one week after pruning. The growth regulator was applied two weeks after pruning.

Results and Discussion

No of pods per tree

The prime character to be observed towards economic yield was the number of pods per tree. In this present assessment, T₁ recorded higher number of pods *i.e.* 221 and lower in T₃ (181.8). T₁ recorded higher than the mean value of 198.33 pods per tree. This clearly indicates that, the increase in the number of pods per tree may be a result of higher number of branches and canopy spread.

Tree canopy

The tree canopy ranged between 3.76 m T₂ to 4.38 m in T₁. The mean tree canopy spread was 3.97 m. The percent decrease over the farmers practice was 15.01% which might contributed to higher number of pods per tree. It was noticed that the plots under pruned treatments treated with growth retardants flowered earlier as compared to unpruned plants. Flowering was observed between second fortnight of October to second fortnight of November 2018 in RP and AP, however first flowering was notice during February 2019 in FP. This is one of the important character that attributed towards higher net income than the FP. And a note to add, that the total number of rainy days was only 5 days with 60 mm during the entire flowering season, which attributed a positive effect for moringa in this particular location.

Individual pod weight (g)

The individual pod weight (tender weight) was one of the prime characters in deciding the final yield and market value. The TNAU technology of July pruning + 0.5% Nitrobenzene recorded the highest pod weight of 96.00 g and 23.07%

percent above the farmers practice.

Individual pod length (cm)

The individual pod length in perennial moringa is one of the important trait that decides the market value. The PAJANCOA & RI technology of July pruning + MC @ 50 ppm (Chamatkar) recorded the highest pod length of 96.60 cm and 17.08% percent above the farmers practice.

Yield (t/ha)

With regard to yield per plant, there was drastic difference between the farmers practice and the technologies assessed in terms of harvesting season. The total yield per ha in farmers practice was 17.32, however the technologies T₂ recorded 18.45 t and T₃ was 15.63 t/ha. The percent increase over the farmers practice by T₂ was 6.50%, and also it was observed that the farmers practice out yielded the T₃ by 10.81%. The decrease may be due to higher accumulation of photosynthates due to larger canopy than T₂ and T₃. However the yield of T₂ was higher than T₁, indicate that the optimum tree canopy maintenance for perennial moringa for this particular location. This need to be tested in larger area to observe the suitability in different geographical locations.

Cost economics

The net returns per hectare was higher in T₂ (Rs. 8,33,520/ha), followed by T₃ (Rs. 6,62,660/ha) and lower in T₁ (Rs. 2,81,760). The percent increase over the T₁ was 66.19%. The benefit cost ratio was higher in T₂ and T₃ *i.e.* 4.30 and 3.40 respectively.

Table 1: Effect of growth regulator on yield and economics

Technology Option	No. of trials	Season of harvest	Yield (t/ha)	Net Returns (Rs./ha)	BCR
T ₁ - Farmers' Practice (no pruning)	5	April- May	17.32	2,81,760	2.84
T ₂ - July pruning + 0.5% Nitrobenzene (Boom flower)		Jan-Feb	18.45	8,33,520	4.03
T ₃ - July pruning + MC @ 50 ppm (Chamatkar)		Feb- March	15.63	6,62,660	3.40

Table 2: Effect of growth regulator on growth and yield attributes

Treatments	No of pods per tree	Tree canopy (m)	Individual pod weight (g)	Pod length (cm)
T ₁ - Farmers' Practice (no pruning)	221.00	4.38	78.00	82.00
T ₂ - July pruning + 0.5% Nitrobenzene (Boom flower)	192.20	3.76	96.00	88.20
T ₃ - July pruning + MC @ 50 ppm (Chamatkar)	181.80	3.78	86.00	96.60
Mean	198.33	3.97	85.33	92.46

Feed back of the farmers involved

The farmers never prune or pinch the flowers in the perennial moringa. It was a habit to spray nitrobenzene during February when the flowering starts and profuse yield was expected in May to June. Even though the yield was higher, the market price decides the fate of agricultural produces and the farmer. Sometime the cost of cultivation and gross income were on par which lead to poor social life or leave farming and switch over to other jobs in the nearby villages. While introducing the technology of pruning during July by KVK Madurai, there was a random hesitation between the farmers as the flowering will coincide with rainy season. Fortunately there was less or low intensity of rainfall this year, which need to be practiced over period of time to confirm the effect of July pruning.

There was a drastic change in our income when the fruits were harvested during January to February. Even though the cost of cultivation was almost double than our regular practice, the market price @ Rs 60 per kg on average of 24 pickings is a welcoming factor and new to our area. Even

under own practices, the produce was sold at Rs.25 per kg during April 2019 was much higher than previous years. Other wise it will be only Rs 10-12 per kg. Many times the yield was distributed over 2 -3 months which will drastically reduce the total yield in terms of produce quantity required to send the market, theft, pest and disease incidence, mainly market value and other social problems.

Feed back to the scientist who developed the technology

Practicing pruning and removal of debris by manual labour is much costlier and there is a demand of laborers in the village. Hence alternate planting distances may be studied to plan for mechanization may be thought off to reduce the cost of cultivation.

The same treatments may be again tested in different location to confirm the yield during off season when there is severe rain or inducing artificial rain through raingun or sprinklers during the flowering period.

Conclusion

The total yield per ha in farmers practice (no pruning) was 17.32 t, however the technologies T₂ (July pruning + 0.5 % Nitrobenzene (Boom flower) recorded 18.45 t and T₃ (July pruning + MC @ 50 ppm (Chamatkar) was 15.63 t/ha. The percent increase over the farmers practice by T₂ was 6.50%, and also it was observed that the farmers practice out yielded the T₃ by 10.81%. During January to February harvested fruits fetch more prices and ultimately farmers will get more income. The economic status of the farmer will be increased. Even though the cost of cultivation was almost double than our regular practice, the market price @ Rs 60 per kg on average of 24 pickings is a convivial factor and new to our area.

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