Original Research Article

Economics of Jasmine (*Jasminum sambac* (L.) Production Influenced By Split Application of Fertilizers

ABSTRACT

As a major commercial sector of agriculture, floriculture has emerged. One of the most often used types of jasmine that is grown commercially in India is *Jasminum sambac*. Time and rate of fertilizers applications can be a part of a successful, economical, and eco-friendly nutrient management plan. Given the aforementioned information, the current experiment was conducted with the aim of determining the impacts of split N, P, and K fertilizer application on the economics of jasmine *(Jasminum sambac*) production. The experiment was depicted under Randomized Block Designed with five replications and five treatments *i.e.* 50%N+100%P+100%K at last week of December and 50%N in last week of June (T_1), 50%N+75%P+75%K in last week of December + 25%N+25%K in last week of March + 25%N+25%P in last week of June (T_2), 50%N+50%P+50%K in last week of December + 25%N+25%P+25%K in last week of March + 25%N+25%P+25%K in last week of June (T_3), 50%N+50%P+50%K in last week of December + 25%N in last week of March + 25%N+50%K+50%P in last week of June (T_4) and 50%N+50%P+50%K in last week of December + 25%N+50%P+50%K in last week of March + 25%N in last week of June (T_5) at Navsari Agricultural University, Gujarat, India on *Jasminum sambac* variety Baramasi. The highest net returns (Rs. 4,11,729/ha) and BCR (2.71) and were recorded with the application of (T_3). The application of application of RDF (120:240:120 kg/ha) in three splits (application of 50%N+50%P+50%K in last week of December + 25%N+25%P+25%K in last week of March + 25%N+25%K+25%P in last week of June) increased yield with highest net return and BCR and therefore, was economically deduced best for the production of *Jasminum sambac*.

Keywords: BCR; Economical; nutrient management; net return; RDF.

INTRODUCTION

India's economy is heavily reliant on the economics of agricultural products because it is mostly an agricultural nation. In India, 70% of households in rural areas rely only on agriculture for their subsistence. The Government of India has earmarked Rs. 2250 Crore for the development of the horticulture industry during 2021–2022, taking into consideration the enormous potential and importance of the sector in raising farmers' income. On an area of 25.66 million hectares, the nation produced 320.77 million tonnes of horticulture in 2019–20, the biggest amount ever. The overall horticultural production in the nation is 326.58 lakh MT from an area of 27.17 lakh ha, according to the first advance estimates for 2020–21 [2]. In India, floriculture production covered 322 thousand hectares from 2020 to 21; 828 thousand tonnes of cut flowers and 2152 thousand tonnes of loose flowers were produced during that time [3].

Jasmine is regarded as the queen of flowers and is referred to as the "Belle of India" or the "Queen of smell" due to its wonderful perfume, which is used to calm and revive [4]. India's flower industry has enormous potential to increase export revenues, generate employment, and generate money. The social culture of our nation places a high value on flowers. Due to greater returns per unit and an increase in "saying it with flowers" on all occasions, jasmine planting is increasingly seen as a feasible diversification from the conventional field crops. The flower is used for a variety of things, including constructing garlands, accessorising women's hair, and making religious offerings. Jasmine concrete, used in the cosmetic and fragrance industries, is also produced using it. In India, there are more than 80 kinds, but only three are cultivated commercially [9].

Split fertilizer applications is a crucial component of nutrient management since it improves the effectiveness of fertilizer use. It makes flower farming lucrative, efficient, and ecologically friendly. A successful fertilizer management programme may assist producers in achieving the four R's of nutrient stewardship: right source, right rate, right time, and right location [11]. In addition to other considerations, providing the correct balance of nutrients at the appropriate way is essential for improving crop output. When nutrients are treated as fertilizer as a base dosage or top dressing, they are prone to leaching, fixation, and losses in the soil [12].

In addition, less than 50% of the fertilizer provided is used by the plants since the nutrients go farther, beyond the active root zone. By avoiding difficulties with excessive fertilizer use, both the expense of fertilizer and environmental damage are reduced [10].

Economics is a key factor for producers in choosing their crops, and it is also a crucial component of flower crop production technology. To increase agricultural output, it is crucial that irrigation applications are economically viable. Given the aforementioned information, this experiment was conducted to examine the impacts of fertilizer application split on the economics of jasmine production.

2. MATERIALS AND METHODS

2.1 Experimental Site and Weather Data

The present investigation was carried out during the year 2018-19 at Floriculture Research Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat, India. According to agro-climatic conditions, Navsari is classified under ‘South Gujarat Heavy Rainfall Zone -I and Agricultural Ecological Situations-III’. The climate of this region is characterized by fairly hot summer, moderately cold winter and humid warm monsoon with heavy rainfall. Temperature ranges during winter varies from 10º C to 23.8º C with low humidity. Summer season commences from February end and ends by May with temperature ranging from 20º C to 36º C. Relative humidity varies from 30 to 90 %. Average annual rainfall of this region is about 1500 mm.

2.1.1 Soil characteristics

The Physical and chemical properties of the soil of the experimental field were determined. The soil samples were taken randomly from surface level of 0 to 30 cm depth of the experimental plot before commencement of the experiment and a composite sample was taken and prepared for analysis of physico-chemical properties. The soil characteristics are presented in Table -1.

Table 1. Physico-chemical properties of the soil of 0-30 cm depth

Physical properties

Sr. No.	Particulars Initial	Initial value
1	Coarse sand (%)	1.70
2	Fine sand (%)	9.07
3	Silt (%)	24.62
4	Clay (%)	64.61
5	Textural class	Clay
	Chemical properties	
7	Soil pH	7.70
8	Electrical conductivity (dSm^{-1})	0.36
9	Organic carbon (%)	0.63
10	Available N (kg ha^{-1})	248
11	Available P_2O_5 (kg ha^{-1})	39
12	Available K_2O (kg ha^{-1})	495

2.2 Treatment Details

The experiment was conducted with five treatments T_1 - application of 50%N+100%P+100%K at last week of December and 50%N in last week of June, T_2 - application of 50%N+75%P+75%K in last week of December + 25%N+25%K in last week of March + 25%N+25%P in last week of June, T_3 - application of 50%N+50%P+50%K in last week of December + 25%N+25%P+25%K in last week of March + 25%N+25%P+25%K in last week of June, T_4 - application of 50%N+50%P+50%K in last week of December + 25%N in last week of March + 25%N+50%K+50%P in last week of June, T_5 - Application of 50%N+50%P+50%K in last week of December + 25%N+50%P+50%K in last week of March + 25%N in last week of June with five replications in Randomized Block Design (RBD).

2.2.1 Pruning

Pruning was done at 50 cm height from the ground level during second week of December, 2018 to obtain plants with uniform height.

2.3 Method of fertilizers application

Nitrogen, phosphorus and potassium were applied in the form of urea, single super phosphate and muriate of potash in splits as per treatments. Fertilizers were applied in 15 cm deep furrows opened around the plants 30 cm away from trunk.

2.4 Calculation of Cost of Cultivation

Cost A, Cost B, Cost C, Gross return, Net return, Benefit Cost Ratio were computed as part of cost of cultivation. Formula for calculation of cost of cultivation is given below [6]. Details of economics of Jasmine cultivation affected by split applications of fertilizers were given in Table 2 & 3.

Cost A_1: It includes, value of hired human labour, value of hired and owned machine labour, value of seed (both farm seed and purchased), value of manures (owned and purchased) and fertilizers, depreciation on fixed assets, irrigation charges, land revenue, interest on working capital and miscellaneous expenses.

Cost A_2: Cost A_1 + rent paid for leased in land (here, rent paid for leased in land is not applicable so, A1 = A2)

Cost B_1: Cost A_1+ interest of fixed capital (excluding land)

Cost B_2: Cost B_1 + rental value of owned land + rent for leased in land (Here, rent for leased in land is not applicable)

Cost C_1: Cost B_1 + imputed value of family labour (Here, imputed value of family labour is not applicable)

Cost C_2: Cost B_2 + imputed value of family labour (Here, imputed value of family labour is not applicable)

Cost C_3: Cost C_2 + 10 per cent of cost C_2 as management cost.

Gross return = Jasmine bud yield (kg) × Price of 1 kg of bud (Here, price of 1 kg pod is Rs. 75)

Net return = Gross Return – Total cost of cultivation

$$\text{BCR} = \frac{\text{Net income}}{\text{Total cost of cultivation}}$$

3. RESULTS AND DISCUSSION

The economics of jasmine production were significantly impacted by the application of 50%N+50%P+50%K in the week of December, 25%N+25%P+25%K in last week of March, and 25%N+25%P+25%K in last week of June, as shown in Table 3 and a comparison of net income and BCR impacted by various treatments in Fig. 1. The treatment T_3 had the highest net revenue (4,11,729 rupees per hectare) and BCR (2.71). While the treatment T_1 showed the lowest net income (Rs. 3,45,417 per hectare) and the treatment T_2 showed the lowest BCR (2.43).

Outcome regarding economics was might be due to the reason that maximum flower bud yield with improved fertilizer uptake efficiency by jasmine plants. The split application of fertilizer also plays a significant part in fertilizer usage efficiency by supplying the essential nutrients at the right time, converting energy to reproductive development, and eventually increasing flower output, which lowers costs and boosts net income and BCR. While at the busiest times, nutrients were not administered in (T_1 and T_2), which resulted in a decrease in net revenue and BCR. In addition, by applying fertilizer in two split over the course of the growing season as opposed to just once before or at planting, plants are better able to absorb all of the nutrients, which results in high-quality flower buds that sell for more money off-season. This will result in good income. The results are in accordance with the finding of [1] in jasmine, [5] in marigold, [7] and [8] in tuberose.

Fig. 1. Influence of application of split fertilization on net income and BCR of Jasmine

Table 2. Operational cost for application of treatments

Operations	Cost (Rs.)
Irrigation charges (16 hrs. x 30 Rs.)	7200
Urea (261 kg)	1545
SSP (1500 kg)	11700
MOP (200 kg)	3800
Pruning cost	14000
Plant protection	9500
Planting material	9920
Total	57665

No.	Item	T_1	T_2	T_3	T_4	T_5
1	Planting material(Amortized cost)	9920	9920	9920	9920	9920
2	Pruning	14000	14000	14000	14000	14000
3	Insecticide	9500	9500	9500	9500	9500
4	Weeding charges	21600	21600	21600	21600	21600
5	Irrigation charges	7200	7200	7200	7200	7200
6	Depreciation	300	300	300	300	300
7	Interest on working capital@7% of 1 to 7	4376	4376	4376	4376	4376
8	Common cost (1 to 8)	66896	66896	66896	66896	66896
9	Treatment cost	64825	72715	80715	72715	80715
10	Cost A (8+9)	131721	139611	147611	139611	147611
11	Yield kg/ha	6418	6568	7514	6622	7260
12	Price- Rs./kg	75	75	75	75	75
13	Gross income (11*12)	481319	492568	563521	496630	544546
14	Fixed cost B (Rental value of owned land 6.25% of 8)	4181	4181	4181	4181	4181
15	Total cost B (10+14)	135902	143792	151792	143792	151792
16	Net income (13-15)	345417	348776	411729	352838	392754
17	Returns per rupee (16/15)	2.54	2.43	2.71	2.45	2.59

Table 3. Economics of Jasmine cultivation affected by split application of fertilizers

4. CONCLUSION

By taking into account the results of the current experiment, it can be said that applying 50%N+50%P+50%K in the last week of December, 25%N+25%P+25%K in the last week of March, and 25%N+25%P+25%K in the last week of June helps to improve yield and increase net income (Rs. 4,11,729 per hectare) and BCR (2.71), as well as by supplying the nutrients needed at the right time, which results in producing high quality flower buds in the off-season not only lowers costs but also generates more revenue than other treatments. Thus, T_3 is regarded as economically viable for the production of jasmine in comparison to all other treatments.

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