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Effect of CPPU (Sitofex) on Quality and Yield in Kiwi Fruit

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ABSTRACT

The study was carried out at farmer's field in Chamba district of Himachal Pradesh on kiwifruit cv. Allison spaced at 4m x 6m. Allison is a leading and most popular cv. of kiwifruit and a heavy bearer needs fruit thinning so that the fruit attains a proper grade in relation to fruit size and yield. A grade fruits fetch a better price in the market and small fruits are non desirable, not saleable and therefore uneconomic. The present study was conducted by spraying vines with CPPU (Sitofex). There were three treatments as T_1 sitofex @5ppm, T_2 sitofex @10 ppm and T_3 (control, no spray). The highest average yield (34 kg/vine) and production of 14.1t/ha. was recorded in vines sprayed with 5 ppm CPPU with net return (Rs.17.46 lakh/ha.) and B:C ratio of 4.65 was recorded followed by vines sprayed with 10 ppm CPPU where average yield (29 kg/ vine) with production of 12 t/ ha. and net return (Rs.14.34 lakh/ha.) and B:C ratio of 3.82 was recorded. The lowest average yield (25 kg/ vine) and production of 10.4 t/ha. and net return (Rs. 11.85 lakh/ha.) and B:C ratio (3.16) was recorded in vines which were not sprayed. Maximum A grade fruits (55%) were obtained in vines sprayed with 5 ppm CPPU followed by 10 ppm CPPU where 50 per cent A grade fruits were obtained. The lowest A grade fruits (30 %) was recorded for control.

Key Words: Allison, Kiwifruit, CPPU (Sitofex), Yield, grade, B:C ratio.

INTRODUCTION

Kiwifruit (*Actinidia deliciosa* chev.) is the most popularity gaining crop for mid hills and low lying area of the hilly states of India in recent times. It has emerged as a boon for farmers and besides Himachal it is successfully grown in other states like Arunachal Pradesh, Nagaland, Manipur, Sikkim, Jammu and Uttarakhand. Known as a complete food "sampuranphal". It is rich in antioxidants and Vitamin C, has fare amount of vitamin E, folate, potassium, calcium, magnesium sugars and dietary fibres. The fruit is known to boost immunity and is beneficial to individuals having high blood pressure, helps in development of foetus, suitable for curing constipation and sleeplessness and other gastrointestinal disorders. The enzyme actinidain helps in protein digestion (Richardson *et al*, 2018). Besides having so many health benefits, high return per unit area, high yield, regular bearer, no serious insect pest and diseases or bird and animal damage, multiple uses (fresh as well as processed), long shelf life are some of the factors which make kiwi as a unique, popular and economical fruit especially in mid and low hills (Chandel and Rana, 2002).

Chamba is the historical and renowned hilly district of Himachal Pradesh and starts from an altitude of 645 m and extends up to 6776 m. Due to such diversity in agro climatic conditions, generally all type of fruits, vegetables and flowers are grown here and 90 per cent of the population is engaged directly or indirectly with agriculture. Low lying areas and mid hills of Chamba are highly suitable for crop like kiwifruit which has emerged as an alternate and highly profitable venture for marginal

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Input Cost (on hectare basis)	Cost in Rs. (approx.)
FYM @ 10 kg /vine, Fertilizer : Calcium nitrate @2.6 kg/vine SSP @ 1.9 kg/vine; MOP @ 600 g/ vine	73,000
Sitofex @ Rs. 3200/ ltr	20,000
Labour (740 man days @ Rs. 350/ day)	2,59,000
Miscellaneous	23,000
Total Expenditure	3,75,000

areas where apple production is no more suitable due to change in the climate (Banyal and Banyal, 2020). Many farmers of the district have already established as a kiwifruit grower and are earning good income and fruit quality and size has been excellent with the intervention of KVK, Chamba. Allison cultivar is the first choice of the farmer due to its regular and high bearing behavior but due to heavy bearing fruit remains small and fetches very low price which is totally non desirable and grades in kiwifruit production is of utmost importance as price variation is huge between grades. Home trial was carried out by spraying sitofex at different concentrations at pea size fruit stage to enhance fruit size as well as productivity.

MATERIALS AND METHODS

On Farm Trial (OFT) was conducted in 2018 in Chamba district of Himachal Pradesh, India. The trial was conducted on 7 yr of age kiwi orchard of farmer's field in cultivar Allison spaced at 4m x 6m spacing. The plants were trained on T- bar trellis. Spray of CPPU (Sitofex) at 5 ppm and 10 ppm was done at pea size stage of fruit development and control kept as no spray. Pruning of kiwi vines up to 4 fruit bud was done as a standard practice in all the plants. Average yield and per cent of fruits in different grades were recorded treatment wise and benefit cost ratio was calculated. The fruits having weight more than 70 g were categorized as A grade and fruits weighing between 50 – 70 g were categorized as B grade and fruits weighing less than 50 g were categorized as C grade. Although initial cost of supporting structure (T- bar, 1.25 high angle iron: 65 x 65 x 6mm, GI Wire 4 mm, earth work for foundation laying 1.5 ft x 1.5 ft, cement concrete in foundation) for 416 plants/ ha is approximately Rs. 10.5 lakhs which was not taken into account as it is non recurring (One time investment) and recurring cost on year basis for inputs and labor was worked out to be Rs. 3.75 lakh/year. Average cost irrespective of grades was calculated to Rs. 150 per kg.

RESULTS AND DISCUSSION

The data (Table 1) revealed the significant effect of CPPU on fruit growth parameters. Highest average yield per vine (34 kg) and 14.1 t/ha was recorded for the treatment, T_2 (spray of 5 ppm CPPU) followed by the treatment, T_3 (spray of 10 ppm CPPU) with average yield per vine (29 kg) and production of 12.0 t/ha. The lowest yield was recorded for the treatment, T_1 under control (no spray of CPPU) with average yield per vine (25 kg) and production of 10.4 t/ha. The share per cent grade wise i.e 55 per cent fruits were categorized as A grade and 33 per cent fruits were categorized as B grade and 12 per cent fruits were categorized as C grade for the treatment, T_2 and 50 per cent fruits were categorized as A grade and 30 per cent fruits were categorized as B grade and 20 per cent fruits were categorized as C grade for the treatment, T_3 and 30 per cent fruits were categorized as A grade and 40 per cent fruits were categorized as B grade and 30 per cent fruits were categorized as C grade for the treatment, T_1. CPPU, N (2 chloro-4-pyridyl)-N – phenyl urea having cytokinin like activity is known to enhance fruit set, improve fruit size, cluster weight and quality in kiwifruit. Banyal *et al*, (2013) and Banyal and Banyal (2020)

Table 1. Effect of CPPU on yield, grades and economic analysis (gross return, net return and Benefit cost ratio) on kiwifruit cv. Allison.

Treatment	Average Yield / vine	Production (t/ ha.)	Grades (%)	Gross Return / ha. (Rs. lakh)	Net Return /ha. (Rs. lakh)	Input Cost (Rs. lakh)	B:C Ratio
T_1: Control (No Spray)	25	10.4	A Grade: 30 B Grade : 40 C Grade : 30	15.60	11.85	3.75	3.16
T_2: 5 ppm CPPU	34	14.1	A Grade: 55 B Grade : 33 C Grade : 12	21.21	17.46	3.75	4.65
T_3: 10 ppm CPPU	29	12.0	A Grade: 50 B Grade : 30 C Grade : 20	18.09	14.34	3.75	3.82

in their study on use of CPPU on kiwi and apple respectively, also found CPPU at 5 ppm to increase fruit size and yield in kiwi. Babita and Rana (2015) also reported CPPU at 5 ppm along with thinning up to four fruits shoot to get maximum fruit weight, length and diameter.

Highest net return (Rs 17.46 lakh/ha.) and B:C ratio (4.65) was also recorded for the treatment, T_2 followed by the treatment, T_3 with net return (14.34lakh/ha.) and B:C ratio (3.82). The lowest net return (Rs. 11.85/ha.) and B:C ratio (3.16) was recorded for control. Dutta (2018) evaluated the economic analysis of kiwifruit farming in Kullu district of Himachal and reported B:C ratio of 3.09. In the present study B:C ratio of 3.18 was recorded under control hence this ratio can be improved by the use of CPPU.

CONCLUSION

The most popular cultivar of Kiwifruit in India is Allison so far which is a heavy bearer and to improve fruit size and to get good return CPPU at 5 ppm at pea size fruit development is recommended. Yet other concentrations between 5 to 10 ppm CPPU and time of application can further be tested in near future for better results.

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