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Short Communication

Management of Pre-mature Fruit Dropping in Coffee

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ABSTRACT

Coffee is one of the most popular non-alcoholic beverages consumed all over the world. The coffee industry offers livelihood for millions of people directly and indirectly among the coffee growing countries. The crop is known to be affected by many diseases during different seasons. Pre-mature fruit dropping is a major limiting factor in production and productivity of coffee cultivation in Kodagu district of Karnataka. A technology assessment was carried out to evaluate the various technological options for the management of pre-mature fruit dropping in coffee in Nalluru and Ponnampet villages of Virajpet taluk, Kodagu district in Karnataka. Four different technologies were assessed during 2021-22, in randomized block design replicated five times, comprising of four treatments. The results revealed that, spraying of Bordeaux mixture 1% + Naphthalene acetic acid (NAA) 50 ml in 200 litres of water during June month was found to be better in terms of retention of number of berries /cluster (28.2), less number of fruit dropping per plant (8.0), less black rot disease (6.75) and also resulted in higher cherry coffee yield per ha (37.5 t) as compared to other treatments. Hence, the above technological package had proved to be highly effective in managing the pre-mature fruit dropping in coffee.

Key Words: Coffee, pre-mature fruit drop, black rot, Naphthalene acetic acid, Bordeaux mixture.

INTRODUCTION

Coffee is one of the most widely traded agricultural commodities in the world. It occupies a place of pride among plantation crops grown in India. Indian coffee is grown in one of the most sensitive hotspots in the world, called the Western Ghats, which is a treasure house for flora and fauna. Cultivation of this stimulating beverage crop is mainly confined to the southern states of Karnataka, Kerala, Tamilnadu and some parts of Andhra Pradesh. India is the only country that grows most of its coffee under shade. Indian coffee is making dent worldwide as eco-friendly coffee with good quality (Sunanda and Nagaraja,2014). Kodagu district in Karnataka is the hub for coffee production. It is the livelihood for 80% of its residents and every farmer in Kodagu produce around 50-500 bags of coffee every year (Prabhakara, 2017). Even though coffee is the key cash crop, of the region numerous production constraints have been affecting the production and productivity of the crop. Abiotic and biotic factors are the major constraints of coffee production in the world among which, fungal diseases attacking fruits, leaves, stems and roots, reduce the yield and marketability (Dechassa, 2019). The impact of climate change especially the variations in rainfall pattern both in terms of quantum and distribution is commonly experienced in coffee growing areas of Kodagu. For the last three years, the coffee growing regions of Kodagu district has received unusual rains during monsoon season with erratic distribution patterns. This high quantum of rainfall in short periods has lead to flooding of plantations, soil erosion and water logging in root zone causing wet foot condition. Thus, the soil saturation coupled with cool ambient temperature and high relative humidity provide ideal conditions for flare up of diseases such as stalk rot, black rot and leaf spot causing defoliation and also the pre-mature fruit drop, affecting crop production to a great extent. In

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general, the pre-mature fruit drop is seen to an extent of 5 to 8 % in arabica and about 10 % in Robusta during monsoon season. During June–July months, which also coincides with berry development stage (90 to 120 days after flowering), due to soil saturation hormonal imbalance occurs, which results in reduction in cytokinins and increase in the content of Abscissic acid (ABA). Certain other factors such as reduction in carbohydrate content, nutrient deficiency, multiple blossoms (running blossom) resulting in formation of different sized berries and over bearing causing competition for carbohydrate reserves *etc.,* also contribute for pre mature fruit drop. In addition to the usual extent of pre mature fruit drop, it flare ups due to rot diseases and physiological disturbances caused by unfavourable climatic conditions (Reddy *et al*, 2020).

Berry dropping and black rot in coffee are caused by the fungus *Koleroga noxia* is one of the major disease which causes yield loss up to 20-30% and infects both arabica and robusta coffee cultivars (Giri *et al*, 2019). In India, the *Myrothecium* fungal infection on coffee was considered as a minor disease in the past but in recent years the leaf spot and stem necrosis disease caused by Myrothecium is a major problem mainly during continuous rainy season (Daivasikamani *et al*, 2016). The Coffee berry dropping is due to infection of the many fungi which appear between four and six weeks after flowering, when they are most susceptible, and also under wet conditions (Rutherford and Phiri, 2006). Keeping this in view, ICAR-Krishi Vigyan Kendra, Gonikoppal, Kodagu conducted technology assessment on management of pre-mature fruit dropping in coffee in Kodagu district of Karnataka.

MATERIALS AND METHODS

Technology assessment on management of pre-mature fruit dropping in coffee was carried out at Nalluru and Ponnampet village of Virajpet taluk, Kodagu with 5 farmers with four technological options. The four different technologies assessed were T_1: Spraying of Bordeaux mixture 1% + Naphthalene acetic acid (NAA) 50 ml in 200 litres of water during June; T_2: Spraying of Propiconozole (1ml /l) during June; T_3: Spraying of Bordeaux mixture 1% during June; T_4: Control plot. The assessment was laid in randomized block design with 5 replications and 4 treatments. The trial was carried out during 2021-2022. For each treatment, 0.25 ha of robusta coffee plantations was taken in five farmers' field. The observations on number of bearing clusters/branch, number of berries per cluster {(before spraying in June month) and (45 d after spraying- August month)}, number of fruit dropping per plant (before spraying- June month) and (45 d after spraying-August month)}, per cent black rot disease incidence at 45 d after spraying and cherry yield (q/ha) were recorded. The severity of the black rot disease was expressed in percent, which was computed following a standard formula as described below (Singh, 2000).

$$\text{Per cent black rot disease incidence} = \frac{\text{No. of infected berries dropped per plant}}{\text{Total no. of berries /plant}} \times 100$$

RESULTS AND DISCUSSION

Different technologies assessed had a considerable influence on premature fruit dropping in coffee (Table 1). Number of bearing clusters per branch in all the treatment was observed the same. However, number of berries per cluster before the spray was more in T_2 which was followed by T_1, T_4 and T_3 in order. However, a greater number of berries per cluster after 45 d of spraying was observed in the treatment T_1 (28.2) followed by T_2 (26.6), T_3 (21.7) and lowest number of berries per cluster was noticed in the treatment T_4 (13.6), respectively (Fig. 1). Number of fruits dropping per plant before the spray was more in T_4 (46.3) which was followed by T_3, T_2 and T_1 respectively (Table 1; Fig. 2). However, the smaller number of

Table 1. Management of premature fruit dropping in Coffee

Treatment	No. of bearing clusters/ branch	No. of berries / cluster		Fruit dropping (No./pl)		Black rot disease incidence (%)	Cherry yield (q/ha)
		Before spray	45 Days after spray	Before spray	45 Days after spray		
T_1	8.0	30.2	28.2	22.2	08.0	6.75	37.48
T_2	8.0	30.5	26.6	26.6	13.8	11.0	32.52
T_3	8.0	30.0	21.7	30.6	17.0	18.85	26.16
T_4	8.0	30.2	13.6	46.3	28.3	41.50	18.4
SEm±	-	0.20	0.15	0.25	0.09	0.18	0.33
CD (*P*=0.05)	-	NS	0.46	0.78	0.29	0.56	1.02

fruits dropping per plant after 45 days of spraying of Bordeaux mixture 1% + Naphthalene acetic acid (NAA) 50 ml in 200 litres of water during June was obtained by treatment T_1 which was followed T_2, T_3 and a greater number of fruits dropping per plant was observed in T_4 treatment. Less per cent of black rot disease incidence was noticed in the treatment T_1 which was followed by T_2, T_3 and highest black rot disease incidence was found in the treatment T_4. Significantly highest coffee cherry yield of 37.48 q/ha was observed in the treatment with spraying of Bordeaux mixture 1% + Naphthalene acetic acid (NAA) 50 ml in 200 litres of water during June which was followed by T_2, T_3 and lowest cherry yield of 18.4 q/ha was recorded in T_4 (control plot).

Pre-monsoon foliar application of Bordeaux mixture 1% mix with NAA (Planofix) was found to marginally improve the out-turn ratio in Robusta and Arabica coffee and also resulted in considerable increase in dry matter accumulation, bean dry matter content (Patil *et al*, 2019). Physiological interventions by use of plant growth regulators, coupled with adoption of good agronomic practices and disease management reduces pre-mature fruit drop and defoliation and enhances cropping wood for subsequent year, resulting in increase in crop yield by 12–20%. The plant growth regulator such as Naphthalene acetic acid (α-NAA) a derivative of auxins found to reduce pre-mature berry drop in coffee besides increasing vegetative growth of the plants (Machenahalli *et al*, 2020).

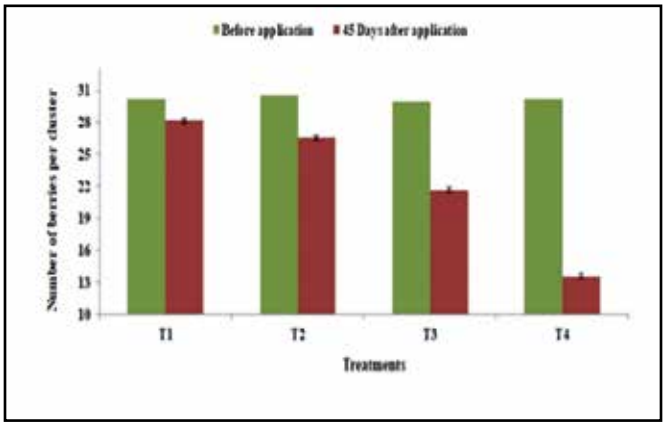

Fig 1. Effect of different technological assessment on number of berries per cluster before and after spraying.

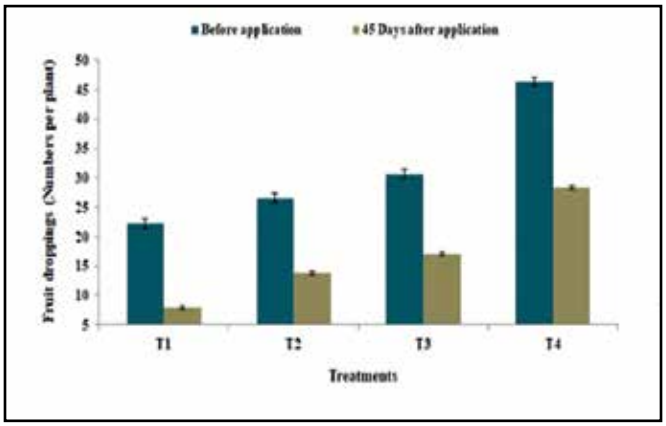

Fig 2. Effect of different technological assessment on fruit droppings per plant before and after spraying.

CONCLUSION

It was found that spraying of Bordeaux mixture 1% + Naphthalene acetic acid (NAA) 50 ml in 200

litres of water during June, performed better in terms of retention of number of berries per cluster, less number of fruit dropping per plant, less black rot disease incidence and also resulted in higher cherry coffee yield. While adopting this technology, the health of the coffee plants was found to better with good vegetative growth of the coffee plants. Hence, T_1 technological option proved to be highly effective for management of pre-mature fruit dropping in coffee in Kodagu district of Karnataka.

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