

Original Research Article

Effect of Calcium and Boron Application on Fruit Set, Yield and Quality of Apple Cv. Ambri

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ABSTRACT

A field experiment was conducted at Krishi Vigyan Kendra- Shopian, SKUAST-Kashmir to study effect of pre-harvest application of Calcium & Boron applications on fruit set, yield and quality of Apple (cv. Ambri) under temperate conditions of Kashmir. It included six treatments of Calcium @ 2g/l, Boron @ 1.5g/l, Ca +B @ 1g/l each, Ca 2g/l + B 1.5g/l, Ca 2.5g/l + B 2 g/l and Control which were replicated thrice under randomized complete block design. All cultural hones like hoeing, fertilization, weeding and sprays against pests and diseases were adopted as per the SKUAST-K recommended package of practice during the course of studies. Among all the treatments foremost number of flowers, fruit yield and fruit set were gotten with Ca 2.5g/l + B 2 g/l. whereas the lowest number of flowers, fruit set and yield was observed in control. The study further revealed that the lowest bitter pit in fruits was observed in Ca 2.5g/l + B 2 g/l and Ca 2g/l + B 1.5g/l treatments. Also, the lowest flower drop and deformed fruits were observed in Ca 2.5g/l + B 2 g/l and Ca 2g/l. Hence it is imperative that calcium and boron should be adequately applied to facilitate and bring about improvement in fruit quality in apple.

Keywords

Calcium, Boron,
Pre-harvest, Fruit
set, Yield, Quality

Introduction

Apple (*Malus × domestica* Borkh) is the foremost vital temperate fruit of Jammu and Kashmir state. The most punctual manor must have been built up within the Kashmir by the turn of sixteenth century. Sovereign Jahangir, in his Tuzk acclaims the Kashmir apple as the 'apples of Kashmir are known for their goodness.' Among diverse cultivars existing within the state, Red Delicious is an imperative late season cultivar which accounts for lions share in apple production. Apple trees like other plants require diverse

supplements in shifting amounts to realize appropriate development and fruiting. Nutrients are known to impact physiological handle with within the plant framework. The satisfactory nourishment is fundamental to preserve legitimate development and accomplish alluring level of great abdicate. Other than major components, macro and micro supplements are moreover required in little amounts that accept basic significance when lacking as these are taken up by the plant and have to be renewed. In numerous cases the quality of harvest produce is decided by the substance of the mineral

supplements. In expansion, storing stability depends upon the substance of particular mineral supplements such as calcium and boron. Foliar application of supplements is profitable beneath the conditions of constrained take-up by roots as affected by unfavorable soil conditions, dry spell, submergence or extraordinary soil temperature. The calcium plays a key part in wide extend of physiological prepare. The part of calcium is well known as a constituent of cell wall within the form of calcium pectate. Its part has been ensnared in gaurd cell physiology and certain chemicals are actuated by calcium. With respect to the likeness of B capacities to other plant supplements, Ca-B relationship is exceptional. Both components play an imperative part in cell wall metabolism and are required for auxin transport prepare (Dela-Fuente *et al.*, 2). Also, B is included in physiological and biochemical forms interior the plant cell, changing the concentration and translocation of supplements (Tariq and Mott, 12). (Marchesner, 7). Boron is fundamental for carbohydrate metabolism and its lack causes cracking and inner and outside cork development within the fruit.

Materials and Methods

The explore was carried out carried out at Krishi Vigyan Kendra- Shopian, SKUAST-Kashmir on Apple (var. Ambri) in the midst of 2018-2019. Six treatments of Calcium @ 2g/l, Boron @1.5g/l, Ca +B @ 1g/l each, Ca 2g/l + B 1.5g/l, Ca2.5g/l + B 2 g/l and Control were replicated thrice beneath randomized complete block design. The cultural hones counting fertilizer application were outfitted as per the package of practices. Trees were showered four times, the primary time before blossom, fruit set, 15 days after fruit set and 30 days after fruit set. The fruit of each treatment were collected at ideal development and were analyzed for diverse

parameters. The yield was evaluated by multiplying total number of fruits per tree with the normal fruit weight of ten arbitrarily chosen fruits. The yield was expressed in kilograms per tree. Ten fruit collect tests were utilized to evaluate frequency and seriousness of externally obvious bitter pit promptly after collect. Fruit samples with abnormal shape are considered distorted. Bloom density or number of flowers/shoot was recorded as the number of floral buds per linear meter of checked shoots counted on four irregular branches from all four sides of the tree as a degree of blossom density within the month of April. Based on the number of flowers that were held on each named branch (per linear meter) the number of flowers were checked as expressed as percent flower drop.

Flower drop (%)

$$\frac{\text{Initial no. of flowers} - \text{No. of retained flowers}}{\text{Initial no. of flowers}} = \text{Flower drop (\%)}$$

Fruit set (%) was calculated as the ratio of total number of fruits per spur to the total number of flowers per spur as follows:

Percentage of fruit set

$$\frac{\text{Total no. of fruits per spur}}{\text{Total no. of flowers per spur}} = \text{Percentage of fruit set}$$

Results and Discussion

The information on the impact of Calcium and Boron on no. of flowers/shoot, fruit set, flower drop, weight, bitter pit and deformed fruits are displayed in Table 1. Most extreme number of flowers 132.23 was watched with Ca2.5g/l + B 2 g/l. Untreated and Control plants had slightest esteem for no. of flowers (98.43). The information uncovered that there's a noteworthy increment in no. of flowers with the application of Calcium and

Boron. The information on flower drop (table 1) uncovered that altogether slightest flower drop of 16.02 % was recorded with Ca2.5g/l + B 2 g/l, while, altogether greatest flower drop was watched in untreated control plants. Noteworthy contrasts were recorded in fruit set rate among the diverse treatments. Amid course of testing, greatest fruit set of 14.43% was recorded with treatment Ca2.5g/l + B 2 g/l which was taken after by treatment Ca 2g/l + B 1.5g/l (14.25%) be that as it may, significantly low fruit set of 7.26 % was gotten in control. The information portrayed in table 1, uncovered that the Calcium and Boron application beneath testing had positive affect on fruit set. The increase in number of flowers per shoot can be due to the progressing affect of boron on cell division and duplication as well as cell prolongation of the plant (Dutta, 3). As well it can be credited to the affect of boron on overhauling pollen germination. pollen tube advancement, sugar amalgamation and amassing (Shabaan, 9). At the same time, an energetic treatments incorporation of boron in biosynthesis of

auxins might have controlled the fruit drop and increased fruit set and upkeep as well up to advancement in mango (Singh and Maurya, 11). Most vital fruit yield of 99.34 kg/tree was gotten with the treatment Ca 2g/l + B 1.5g/l, taken after by treatment Ca 2g/l + B 1.5g/l which recorded fruit yield of 97.2Kg/tree, though the control recorded the yield of 47.89 kg/tree. Assist the data shown in Table 1 revealed that all the treatment shifts altogether with respect to yield. These comes about are in assention with those gotten by Singh *et al.*, [19] who detailed that, foliar shower of boric acid overhauled fruit set and yield through the foremost lifted diminishment in fruit abscission expanded emphatically beginning fruit set and number of held fruits per panicle at gather than the control. Parallel understanding with those point by point by Kumar *et al.*,(6) and Hafle *et al.*,(4) Saleh and El-Monem [14] and Singh and Maurya (11) who detailed that foliar sprinkle of calcium nitrate at 2% recorded the foremost noteworthy number of fruits per tree.

Table.1 Effect of Calcium and Boron spray on fruit set, yield and quality of apple cv. Ambri

S.No	Treatment	No. of Flowers/m branch	Flower drop (%)	Fruit set (%)	Bitter pit (%)	Deformed fruits (%)	Yield (kg/tree)
1	Calcium @ 2g/l	102.23	22.6	10.5	3.5	5.64	77.54
2	Boron @1.5g/l	110.6	20.31	11.34	8.7	9.31	77.03
3	Ca +B @ 1g/l each	109.5	20.10	13.18	7.2	5.27	80.25
4	Ca 2g/l + B 1.5g/l	130.64	16.25	14.25	1.5	2.38	97.21
5	Ca2.5g/l + B 2 g/l	132.23	16.02	14.43	1.5	2.26	99.34
6.	Control	98.43	30.67	7.26	25.43	43.23	47.89
	CD> 0.05	6.23	2.64	1.25	1.08	1.13	3.64

This may be due to that calcium sprinkles well kept up the middle lamella between plant cells which lead to decrease fruit drop. The data inside the Table 1 empower revealed that scarcest rate (2.26 %) of turned fruits was recorded in treatment Ca2.5g/l + B 2 g/l taken after by Ca 2g/l + B 1.5g/l (2.38%). While as the foremost extraordinary rate of distorted fruits was recorded in control (43.23%).

The extreme appraise accomplished and the shape of the fruit depends on the number of blossoms pollinated and fertilized and the design of fertilization of blooms. Unfertilized blossoms as well lead to unusual shape of the fruits (Sharma, 10).

It has been found that B lacking limits the germination of dust grains. Imbalanced fertilization in a few cases causes to progress fertilization.

In case fertilization and fertilization come up brief to happen interior 3-6 days after anthesis, the fruits finished up turned and shriveled in shape (Bose, 1). Boron may invigorate the ordinary stream of hormone and overhaul pollen grain and pollen tube arrangement. It additionally increases the stickiness of the stigma for accepting the pollen grains. Halder *et al.*, (5) recorded most essential cruel ordinary fruits (111/tree) and most diminished percent of twisted fruits (24%) due to application of most raised level of B (15 g tree⁻¹). Smallest bitter pit rate was recorded in Ca2.5g/l + B 2 g/l and Ca 2g/l + B 1.5g/l (1.5%).

While as most essential bitter pit rate was recorded in control (43.23%). The comes around are in understanding with those of Rosenberger *et al.*, (8) who detailed that CaCl₂ donate more better control of bitter pit in Honeycrisp than any of the other materials attempted.

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