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Scope of Avocado Cultivation in the State of Jharkhand

Anita Chakraborty[1] and Sanjay Kumar Sinha[2]
[1]Assistant Professor, Department of Botany, S. P. College, S. K. M University, Dumka
[2]Associate Professor, P.G Department of Botany, S. K. M University, Dumka
E. mail of corresponding author: anitagcenator@gmail.com

Abstract:

The climatic condition and soil quality in the State of Jharkhand, India were found conducive for growing of avocados in large scale though, the highly demandable and popular crop of the present day is yet to get introduced in the fields of the State in commercial level. The fruit is rich source of vitamin C, E, K and B-6. It also contains riboflavin, niacin, folate, pantothenic acid, magnesium and potassium. Besides, this it is rich in Omega 3 fatty acid which helps to improve the metabolic activity resulting in weight loss and improve the cardiovascular health of the humans. It also acts as anti-depress and help to elevate the mood in positive state of mind. It is highly priced and demanding fruit which has high potential to generate the revenue to the cultivators. Commercial avocado cultivation in bulk requires research, acceptance, careful planning, investment, and expertise.

Keywords: Avocado, Cultivation, riboflavin, niacin, folate, pantothenic acid, vitamin C, E, K and B-6, Commercial

Introduction:

Avacado is an ancient sub-tropical fruit originated from Central America and Mexico. Commercial cultivation of this fruits in India is concentrated in the state of Kerala, Tamil nadu, Maharashtra and Karnataka. The scientific name of this fruit is *Persea americana* of family Lauraceae. Fuerte, Pinkerton, Purple Hybrid, Hass, Trapp, Pullock and Round are the few commercial varieties which are most preferred for the purpose of commercial cultivation. This crop is adapted in wide range of soil conditions. Poorly drained soil and water logged conditions are the two major factors for its poor growth and fruits production.

The climatic condition and soil quality in Jharkhand were found conducive for growing of avocados in large scale, though the highly demandable and popular crop is yet to get introduced in the fields of the State in commercial level. The fruit is good and rich source of vitamin C, E, K and B-6. They are also rich in riboflavin, niacin, folate, pantothenic acid, magnesium and potassium. Besides, this it is rich in Omega 3 fatty acid which helps to improve the metabolic activity resulting in weight loss and improve the cardiovascular health of the humans. It also acts as anti-depressor and helps to elevate the mood in positive state of mind. It is highly priced and demanding fruit which has high potential to generate the revenue to the cultivators. Commercial avocado cultivation in bulk requires acceptance, careful planning, investment, and expertise. It is the most nutritive fruit and is rich source of protein (up to 4%), fat (up to 30%) and a very low carbohydrate. The chemical composition of the fat is similar to that of olive oil and is of high demand in the cosmetic industries. It is high energy reserved fruit (245.0 Cal) which is also rich source of vitamins like Vitamin A as carotene (0.7 mg), Ascorbic acid (16.00 mg), Niacin (1.10 mg), Riboflavin (0.13 mg) and Thiamine (0.06 mg) and Minerals like Calcium (10 mg), Chlorine (11 mg), Copper (0.45 mg), Iron (0.60 mg), Magnesium (35 mg), Manganese (4.21 mg), Phosphorus (38 mg), Sodium (368 mg) and Sulphur (28.50 mg) Ghosh, 2000.

Methodology:

Source of Data:

1. Primary Data: Field Survey
   a. Observation,
   b. Interview (face to face) with the small scale and large scale farmers.
2. Secondary Data: Review of Literature
   a. Books
   b. Journals
   c. Internets
   d. Other

Result and Discussion:

In India, the popular and adapted cultivars are Green Type, Purple, TKD-1, Nabal, Linda, Puyevla, Gott-Froid, Furete, Pullock, Waldin confined to states of Tamil Nadu, Kerala, Karnataka and Maharashtra and few patches of North East India that accounts for 5000 tonnes of avocado production. The wide agro-climatic conditions prevailing within the country and availability of high yielding improved varieties are highly favorable for area expansion and bringing avocado under cultivation (Yatung et al, 2023).

The fruit is commonly propagated through seeds (Tripathi and Karunakaran, 2019) though viability has always been the limiting factor since after 2-3 weeks it loses its chances of germination. In India seedling are preferred for the sowing and further germination. Seedlings are grown in the nursery from the seeds procured from the ripen fruits. Seed coats are usually removed to fasten the growth and 8-12 months seedlings are get ready for the transplantation. The seedling take more time to start fruiting and the fruit quality are also variable. The seedling trees usually takes 10-15 years to produce about 300-400 fruits/trees.

Cross-pollination often results in the variability of the fruit set (Whiley, 2002). Thus it is almost impossible to obtain genetically uniform plant in the commercial varieties of the fruit. Thus vegetative propagation of this species is preferred to maintain the superior clones of the species and ensure near uniform quality of the fruits for better market returns.

Vegetative propagation by the means of grafting and budding has shown better results in the establishment of the selected verities. In India research center Fruit Research Station, Kallar, in the Nilgiri Hills of Tamil Nadu established, that layering and as well as inarching gave a success rate of up to 75 percent. The state of West Bengal has established chip-budding giving high results. Unfortunately India has no commercial nursery engaged in the vegetative propagation of this fruit and thus solely at the hands of the State and local agricultural department for all sets of research and establishment of the cultivation and establishment of this fruit plant at a commercial scale.

Avocado is planted out at a distance of 6 to 12 meters depending on the vigor of its variety and its growth habit. The varieties which are highly spreading type are planted with wide spacing from each other. In high water density area, the trees are planted on the mounted areas to avoid the excess of water availability impacting the natural growth of the plant. They can be grown as a mono-crop or can be intercropped or mixed cropping pattern as per the requirement and the availability of the resources (FAO, 2025).

Pruning is common practiced in scientific manner ensuring the desired vegetative and reproductive growth of the tree. Thinning and shortening of the branches, is also practice for the high spreading varieties.

It requires irrigation at an interval of three to four weeks during the dry spell while sprinkling irrigation is reported beneficial and improves the quality of the fruits. Mulching with dry leaves is a common practice to avoid excess moisture loss, during the winter season. Flooding always creates threat and promotes the chances of root rot incidences.

It is a heavy manure demanding fruits. Application of nitrogen is essential for best results. On an average young avocado tree should be given N, P_2O_5 and K_2O in a proportion of 1:1:1 and older trees in the proportion of 2:1:2. At a pH of above 7, iron deficiency symptoms may appear which are controlled by the application of iron chelate at the rate of 35g/tree. Micronutrients like Iron, Zinc and Boron have a profound impact in the growth and fruit quality of the tree.

Both the tree and the fruits are highly susceptible to the insect pests, scales, mealy bugs and mites, which are mainly controlled through the application of the insecticides. Fruit spot disease caused by *Colletotrichum gleosporioides* results in shedding of young fruits. Fruits often become deformed. The infection may remain latent in some fruits.

Accelerated softening of fruits is caused by *Fusarium solani* and *F. sambucinum*. The Fuerte cultivar is attacked by anthracnose (*Glomerella cingulata var. minor*) and stem-end rot (*Dothiorella aromatica*) from fruit set till harvesting periods. The time of infection usually vary with the seasons and is primarily related to amount of rainfall.

Cercospora spot (*Cercospora purpurea*) and scab (*Sphaceloma perseae*) have been reported to attack both leaves and fruits.

The most serious disease of avocado is the root rot caused by *Phytophthora cinnamoni*, leading to death of plant. The disease situation is aggravated by ill drained and waterlogged conditions. Metalaxyl (Ridomil) mixed with soil before planting or applied as a soil drench controls root rot at least for four months after treatment.

The plant starts yielding fruits after 5 to 6 years and sometimes 3-4 years after plantation from the seeds (Eudyan, 2025). The purple varieties change its color from purple to maroon whereas the green varieties changes into greenish yellow after the proper ripening. The fruits become ready to get harvested when the color of the seed coat gets changed from yellowish white to dark brown in color. Mature fruits get fully ripen after 6 to 10 days after the harvesting. A single tree yields about 100 to 500 fruits. Fruits of Purple variety are harvested during July, and for Green variety September-October.

Correct and careful harvesting of the fruit is an essential part of this cultivation practice. The fruits were harvested from the tree when the oil content is about 12 percent and still not fully ripe and soften. Correct stages of harvest always ensure the good quality of fruits and best returns from the market.

250 to 300 grams in size are preferred fruit weight in the common Indian markets. Hass, Fuerte and Green are the most popular varieties. Hard, mature fruits are harvested and allowed to ripen during transportation and distribution to the main vendors/markets. 14 days transport time is considered ideal for its distribution to the markets, though unripe avocados can be stored for up to four weeks under the temperature between 5.5°C and 8°C proper monitoring and administration. Unfortunately there is not an organized marketing system for avocado as the production is small and production areas are scattered all along the country.

The commercial avocado cultivation in bulk requires careful planning, investment, and expertise. State agriculture expert should be involved in soil, climate test and procurement of permit and licenses during agricultural implementation (Tripathi, et. al., 2014).

One of the major challenges for the adoption and dissemination of this crop is the consumer preferences. In the domestic market the availability of many other tropical fruits throughout the year and a varied taste of this fruit may impact its demand adversely. Non- availability and lack of basic health benefits of this fruit amongst the knock and corner of the society is also a matter of major concern. In the recent time, a section of people in society strictly advocating the goal of good and healthy wellbeing are strongly adopting this as a miracle fruit and try to incorporate in their dietary regimes.

The fruit is successfully introduced in the state of Sikkim and is the most acceptable preferred fruits among the tribal population of the hilly regions of the state. This authenticate and also advocate that avocado has serves the purpose of household nutrition security amongst these section of the society.

One of the positive initiatives in the state of Jharkhand is witnessed that, the horticulture department of Birsa Agriculture University (BAU) in Ranchi has started research on the feasibility of growing avocados in their research and extension activities. The research team have also confirmed that climatic condition and soil quality in Jharkhand were conducive for growing avocados, but large scale cultivation of the fruit was never done in the state due to lack of research on its feasibility and financial viability.

The successful adoption and popularization of this fruit both in terms of cultivation and incorporation in the dietary regimes requires a holistic planning and execution (Fig. 1). One fruit which starts from the cultivation to the fruits platter of the consumer requires step by step involvement of different set of stakeholder and skillset. More research institutes, including the State universities should come forward proactively and involves in the research including all the major, minor aspects, steps and linkages involved in the adoption and establishment of the species by the state at a larger scale with an aim of long term sustainability.

Stakeholder targeted incentives, training and information regarding the health benefits, agricultural scope and its sustainability should be promoted. The information dissemination should be communicated in Multilanguage encouraging more into local languages for easy learning and adoption of the techniques. Both the financial and technical security to the proactive farmers willing to take up the new challenge should be ensured and is of utmost priority. The best result and the use of indigenous technique if applied should be highlighted, encouraged and communicated at research and training purposes.

There are several successes stories reported from various parts of southern India including hilly stretches of Western Ghats, Madhya Pradesh, and few North Eastern regions of our country. Among them the tribal communities of Sikkim have achieved the wonders and had incorporated this fruit as one of the protein supplement in their dietary needs. Several blogs/dedicated agribusiness tips and advisory both targeted for national and international agriculturalist are available which can be used and translated to the targeted regional languages to promote and encourage both the farmers and the entrepreneurs of specific regions to get encouraged and adopt this agricultural practice in near future.

Step 1: Selection of variety	• Hass:-Highly resistance variety, adopted to hot and humid environment conditions, high in buttery like consistency with high content of oil. A high demanding fruit. • Fuerte:- Heat and humidity loving variety, fruits are of medium in sized smooth skinned and, creamy texture and of a mild taste. • Green and Purple:-Best adapted variety in India. Low oil content but of high taste. • Exotic varieties:-Like Reed, Lamb Hass etc. are imported varieties, these need careful research and management for commercial adoption.
Step 2: Preparation of land and Plantation	• Soil preparation:- Place for the pantation is identified ensuring proper sunlight. Reasonably deep holes, 8-10 meters apart were digged for the trasplantation of the sapling. It is adviseable to place the root ball is in the same plane as the soil surface and keeping the trunk erect. • Watering:- Water should be sparayed at regular interval to provide the adeqate amout of moisture during the dry spell period. • Mulching:- To retain the moisture for the longer period of time, soil mixed with compost and bark chip are prepared and applied.
Step 3: Orchard Managemen t	• Irrigation:-Drip irrigation is benificial • Fertilization:-Organic fertilizer are preferred over the chemical one. NPK is essential for the growth. Nitroge (N) for leafy growth, Phosphorus (P) for the soild roots, and Potassium (K) for the fruit set. • Pruning and trimming: Trimming of branches that cross and rub each other is essential.. Lower branches are also cut off for the growth of erect trunk. Dead, diseased and crowded branch are removed for disesse free fruits. • Pest and disease management:- Proper monitoring on the emergance of diseases symptoms and after care is essential.
Step 4: Harvest and Post-harvest handling	• Determining fruit maturity:- The fruits usually turns darker when it get ripe. • Harvesting technique:- The stem up to 5cm above the fruit is cut gently with the help of scissor. • Ripening process:- The fruits get ripe after the picking. It always takes 3-7 days at room temperature to get ripe. • Storage and transportation:- After ripning the fruit should be kept in fridge, use of sturdy crates with proper padding is also recommended. Every steps involve in the picking to the trasportation needs care and proper management under strict supervision.

Fig1. Steps involved in the avocado cultivation (Source: https://krishispray.in/blog/successful-avocado-farming-in-india-a-step-by-step-guide)

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