

Introduction of new columnar apple plants in himalayan regions of India

To improve the production and productivity of Apple in Himalayan states of India, BAIF Development Research Foundation, Pune, had introduced short gestation columnar /Mini Apple plants from European country after undertaking performance trial for 5 years at the Research Station in Uttarakhand. Due to shorter height and columnar shape, these plants are found to be very ideal for cultivation in terrace land and also suitable for high density plantation. They can even be grown in pots as garden plants. After successful adaptation in Uttarakhand, the plants are now ready to reach farmer's field.

APPLE (*Malus domestica*) is an important fruit crop of the Himalayan regions of India. However, the productivity of apple varies widely in the four apple growing states of India namely Jammu and Kashmir, Himachal Pradesh, Uttarakhand, and Arunachal Pradesh. The production and productivity of apple in Uttarakhand is very low which further accentuated due to the impact of climate change.

Genesis

To increase the production and productivity of the apple in Uttarakhand, which in turn increases economic status of the farmers, BAIF Development Research Foundation, a Pune based National level NGO, decided to import Columnar/Mini Apple Plants, developed by European countries and assess its performance in Indian context. Accordingly, a few Columnar/Mini Apple plants were imported from M/s Fleuren Nursery, an internationally reputed fruit nursery of Netherlands, in 2015.

Columnar/Mini apple plant

One of the modern apple breeding goals is to produce apple cultivars with columnar growth habit for growing apple in high-density orchards.

The columnar growth habit in apple was initially discovered as a mutant, called 'Wijcik McIntosh' by 'McIntosh'. The favourable characteristics of 'Wijcik McIntosh' have been viewed highly valuable in apple-breeding programs for the genetic improvement.

The Stark Bro's, a fruit-and-vegetable nursery, released the first columnar apples in the United States in the 1990s but subsequently it spread to other European countries as well. M/s Fleuren Nursery of Netherlands also developed this Columnar Apple Plant, and also provided some 100 plants to BAIF to undertake the adaptation trial in apple growing states of India.

Rationale for selection of Columnar/Mini apple tree

The Mini apple trees are a great way to grow apples in a small space of mountainous terrain as they are completely a new product. As the name "Mini Tree" indicates, it is an apple tree that is small sized (up to 2 m high and 50 cm wide) and columnar in shape. Accordingly, about 2600 plants can be grown in one acre (spacing 0.5×3.0 m) and could produce about 13 MT fruits



Sunlight and Goldlane

per acre on 5/6 years (average yield 5 kg/plant) as against 9.6 MT per acre in traditional varieties (spacing 5×5 m and average yield 60 kg/plant on 10/12 years).

Clearances from NBPGR

With a view to ensure that the imported grafts are free from any pests and diseases, the grafts had to undergo vigorous Phytosanitary tests in India, which was conducted by ICAR-National Bureau of Plant Genetic Resources (NBPGR), New Delhi, besides furnishing the Phytosanitary certification from exporting country (Netherlands).

After getting requisite clearance from NBPGR, the plants were planted in 2016 at the BAIF's own Research field at Lohaghat in Champawat district of Uttarakhand.

Location of the BAIF Research Station

The Research Station of BAIF is situated at Talla, Manar village (Khetikhan) of Pati block of Champawat district of Uttarakhand. It is situated at an elevation of 1700 to 1800 feet above the sea level. The latitude and longitude of the Khetikhan is 29.4 degrees and 80.02 degrees. The maximum temperature varies from 23°C to 43° C and minimum temperature varies from 5° C to 24° C during 2018.

Adopted agro-technology

Field preparation and staking: About 2 feet deep pits were dug and filled with FYM and vermicompost before planting. To keep the planted trees straight, a galvanized wire was fixed at two ends of the row. The individual plants were tied with the telephone wire and used for staking the plants.

Planting spacing: The adopted spacing was 3 m × 1 m.

Varieties

Redlane: The Redlane variety has pink flowers, and bears beautiful, edible crab apples in autumn. The Redlane is self-pollinating variety.

Goldlane: A new and distinct *Malus domestica* (Borkh.) apple tree variety which exhibits a columnar tree type, compact growth, predominant bearing on spurs and V_f-resistance against scab. It is also a self-pollinating variety.

Sunlight: The Sunlight variety has white flowers and bears juicy, sweet red apples in autumn. The plant grows slowly and is not self-pollinating. It requires another Apple tree nearby for pollination. Moonlight, Redlane or Gold Lane are excellent combination possibilities. It has circumference between 80-100 cm.

Moonlight: It is a Czech variety of columnar apple tree from 2010. Excellent medium size fruit similar to Golden Delicious in shape and colour, resistant to scab and powdery mildew.

Irrigation

Plants were irrigated manually once a week to maintain optimum moisture in the soil and irrigation interval varied according to the season.

Insect/Pests

No specific pest infestation was seen in Mini Apple, but leaf folder attack was seen in the month of May to June which can be easily controlled by spraying of pesticides.

Anti hailstorm net

It is necessary to install anti hail net over mini apple



Sunlight



Moonlight



Goldlane



Redlane



plants to protect them from hailstorm falls from March to June so that flowers and fruits can be saved.

Growth and yield performance

The average plant height of 180 cm and fruit production of 4 to 6 kg per tree was observed at 5th year of the plant growth. The highest fruit yield was recorded in Sunlight variety followed by Moonlight, Goldlane and Redlane.

Fruit weight

The fruit weight ranged from 91 to 206 g and highest fruit was found in Sunlight (206 g), followed by Goldlane (197 g), Moonlight (172 g) and lowest (91 g) was in Redlane.

Fruit taste

The organoleptic test indicated Red delicious obtained the highest rating points (50) closely followed by Sunlight (49), Goldlane (44), Moonlight (42) and Redlane (40). Farmers from different villages participated in the fruit testing. Among the Mini Apple varieties, Sunlight was most acceptable to the farmers while Redlane was least preferred by them.

Trials at ICAR-CITH

With a view to assess the performance of these columnar/ Mini Apple Plants in different agro-climatic situation of Himalayan region, some plants were shared with ICAR-CITH, Srinagar, with whom BAIF had a MoU to conduct collaborative research for Temperate Fruit Crops. Available information suggests that performance of

the Columnar /Mini Apple Plants at the Research station of CITH, Srinagar, was also found to be good and at par with Uttarakhand.

Field trial at other locations of Champawat district

Field trials were undertaken on farmer's field at Manar, Khetikhan and Forti Lohaghat. Four hundred plants were planted during 2019 and were well adapted to the field conditions. The plants have started bearing fruits. At Mayawati Ashram at Lohaghat, 107 mini apple plants were planted during the year 2020 and satisfactory growth performance observed.

Conclusion

The research and development on Mini Apple at BAIFs research station in Champawat as well as field demonstrations at farmer's field have indicated that Mini Apple varieties are well adapted to the climatic conditions of Uttarakhand. The satisfactory growth and yield performance of Mini Apple revealed that this short gestation Columnar/Mini Apple plants could be successfully cultivated in Uttarakhand as a cash crop. There is great opportunity of developing nursery entrepreneurs of Mini Apple to cater the ever increasing demand of the planting material in Uttarakhand.

For further interaction, please write to:

Dinesh Raturi, BAIF Development Research Foundation, Pune, Maharashtra 411 058. *Corresponding author email: dinesh.prasad.raturi@baif.org.in

Multiplication of clonal rootstocks of apple:

Technology for production of clonal rootstocks of apple by hardwood stem cuttings using soilless growing medium was standardized. It comprised 30 cm cutting along and treatments (Cocopeat 75: vermiculite 25) under greenhouse conditions with cent per cent rooting.



Source: ICAR Annual Report 2021-22