“A Review onAppleFarming in India”

Abstract:-

The cultivation of apples in India has witnessed significant growth and transformation over the years, becoming a crucial component of the country's horticultural landscape. This review provides a comprehensive analysis of the current state of apple production in India, highlighting key factors influencing its cultivation, challenges faced by growers, and the economic impact on the agricultural sector. The review begins by exploring the historical evolution of apple cultivation in India, tracing its origins and the introduction of different apple varieties. It examines the geographical distribution of apple orchards across the country, emphasizing the diverse agro-climatic zones that contribute to the cultivation of this temperate fruit.

Keywords: Cultivation, Varieties, Distribution, Origin.

Introduction

Apples are a popular fruit in India, as it opted third place in popularity of fresh fruits (Shah*et al*.,2022). Apple farming are professionally done in Himalayan region of our country.It is suitably grown in subtropical and temperate regions. The states of Himachal Pradesh, Jammu and Kashmir and Uttarakhand are the major apple-producing regions in India (Islam & Shrivastava, 2018). A range of cultivation methods are used to grow apples, including contemporary high-density plantings and traditional orchards (wani*et al.,* 2018). Apple trees are established in traditional orchards with a spacing of approximately 6 metres by 6 metres. The trees are trained to grow on fences or held up by poles.In high-density plantings, a method known as "super spindle" is used to train trees to grow straight and much closer collectively (Mika, 1991).This is economically beneficial for the production of higher number of trees under a small area and results in higher yields (vedwan, 2008 and Kumar *et al.*,2021).

Additionally to being farmed for the fresh fruit market, apples are also utilised in the manufacturing of a range of value-added goods, such as apple juice, apple sauce, and dried

apples. These goods are well-liked both domestically and abroad, and a sizable portion of India's apple harvest is exported (Yue & Beghin, 2009and naqash*et al.*, 2019).

Apple Producing States in India:

Majorily apple producing states are described below-

Jammu and Kashmir: It isthe major contributor for apple production in India, 77.71% of the nation's total production is produced by the state. (Hartta, 2023). The annual production of apples in Jammu and Kashmir is estimated to be 1808.33 tonnes. Apple growth is facilitated by the state's ideal temperature and rich soil, which contribute to the high level of production. Many farmers and rural communities in the state rely on the apple business for employment and money, which plays a significant role in the local economy.

Himachal Pradesh: It is popularly known as the apple state of India, accounting for 19.19% of global apple production. Several apple cultivars, such as Rich-e-Red, Mollies, Gala, and Anna, are well-known in the state. A range of farming methods are used to raise these apples, including high-density modern plantings and conventional orchards. Many farmers and rural communities in Himachal Pradesh receive work and revenue from the apple industry, which makes a significant contribution to the local economy (Balakrishna, 2011).

Uttrakhand: Approximately 2.52% of India's apple crop is produced in this state, making it a substantial contribution to the country's apple production. Additionally, the government is trying to enhance the methods used in the Dehradun region to produce apples. 58.66 tonnes of apples were produced in Uttarakhand the year before. For farmers and rural people in Uttarakhand, the apple business is a significant contributor to the local economy, offering both employment and revenue prospects. (Negi &anand, 2015).

Arunachal Pradesh: Attributing 0.32% of the nation's total apple production, it is one of the leading apple-producing states in India. The state ranked third among Indian apple-producing states in terms of quantity, having produced 7.35 tonnes of apples the year prior. In Arunachal Pradesh, the apple business plays a significant role in the local economy by giving farmers and rural populations jobs and a source of income (Moyong*et al.*, 2013).

Popular apple varieties-

Red Delicious: This apple variety, which is considered traditional in India, has a vibrant red exterior and luscious, sweet flesh. Its slightly elongated shape makes it a popular choice for both fresh eating and apple sauce preparation.

Golden Delicious: This apple is crisp and delicious with a yellow or golden peel. Because of its adaptability and capacity to maintain its shape when baked, it is frequently used in cooking and pie making. It is a popular option for eating fresh as well and has a circular, tapering shape.

Granny Smith: This apple has a sour flavour and is green in colour. Because of its firm flesh and capacity to maintain its shape when baked, it is frequently used for cooking and pie-making. It is a popular option for fresh dining and has a circular shape.

Fuji: This apple is juicy and sweet, with skin that is both red and yellow. Because of its crisp texture and sweet flavour, it is a favourite choice for fresh eating. Its circular, tapering shape makes it useful for baking and cooking as well.

Gala: This is a crisp, delicious apple with red and yellow skin. It is well-liked for eating fresh and has a rounded, tapering shape. Its solid meat and sweet flavour make it useful in baking and cooking as well.

Honeycrisp: This apple has a reddish-yellow hue and is juicy and tasty. It is a popular option for eating fresh and has a circular, tapering shape. Its solid flesh and sweet flavour make it a useful ingredient in baking and cookery.

Braeburn: This is a crisp, delicious apple with red and yellow skin. It is well-liked for eating fresh and has a rounded, tapering shape. Its solid meat and sweet flavour make it useful in baking and cooking as well.

Pink Lady: This apple is crisp and sweet with a peel that is pinkish-red. It's a popular option for eating fresh and has a circular, tapering shape. Because of its solid flesh and sweet flavour, it's also utilised in baking and cooking.

Suitable climate for apple production :-

An agricultural product suitable for a moderate climate is the apple. However, the regions of India that grow apples do not lie in a temperate zone; rather, the region's temperate temperature is a result of the Himalayan peaks and high elevations. (Rai*et al.*,2013 and Ahmed *et al.,* 2021).During the active growing stage, the summertime average temperature should be between 21 and 24 ºC. Apple grows best in areas where trees have a restful winter and plenty of sunshine for healthy colour development. A height of 1500–2700 metres above sea level is suitable for its

growth. The ideal growing conditions for apple trees are evenly spaced rainfall between 1000 and 1250 mm during the growing season.

Propagation method of apple:-

Rootstocks: Apples are mostly grown by grafting or budding on wild crab apple seedlings. Another option is to use the seedling rootstocks made from the seeds of diploid cultivars such as Granny Smith, Macintosh, Yellow Newton, Golden Delicious, and Wealthy (Marini*et al.*,2018). High density planting is done using dwarfing rootstocks such as M9, M4, M7 and M106.

Budding: Shield budding is the primary method of propagating apples and yields a high success rate. Shield budding involves making a 'T' shaped incision beneath the rootstock's rind to implant a single bud and a shield piece of stem during the active growth period. When the summertime buds are fully formed, budding takes place. In the Kashmir Valley, the Kumaon hills of Uttaranchal, the high hills of Himachal Pradesh, and the mid-hills of Himachal Pradesh, September is the best month for blossoming.

Grafting: There are multiple ways to propagate apples, including clefting, whipping, tongue, and root grafting. Best outcomes are obtained with tongue and cleft grafting between February and March, at a distance of 10-15 cm above the collar. Grafting is often completed by the end of winter.

Planting technique of apple :

The planting technique differs according to variety and the richness level of soil. For planting trees usually one pollinator tree is required for two to three large trees planted at distance of 10 meter. The pollinator tree is planted after every sixth tree in a row for high density planting.

On an average of about 200 – 1250number of plants can be planted in one hectare area.There are four diverse categories of planting density that are –i) low, in which less than 250 plants/ha. Can be grown ,ii) moderate which having capacity of 250-500 plants/ha., iii) high, in which upto 500-1250 plants/ha. and ultra-high density has the capacity of more than 1250 plants /ha.

Irrigation:

Low soil moisture can severely affect apple trees. During the growing season, water stress decreases the quantity and size of fruits and increases June drop. When it comes to the success of apples, a year-round even distribution of rain is crucial, especially during the key seasons when dry spells occur. It is necessary to give additional irrigation. Usually in the months of December and January, the orchards receive their first irrigation just after manuring. The crop is irrigated every seven to ten days throughout the warm months. The crop is irrigated once a week after the fruit setting stage. The colour of the fruit is significantly improved by applying water during the two weeks before harvest. After then, irrigation is administered every three to four weeks till the start of dormancy.

Manure and fertilizer:

Along with other fertilizers, farmyard manure is applied at a rate of 10 kg per year of apple tree age. The amount of organic manure put to the crop and the soil's fertility determine how much fertiliser is needed. For fully grown bearing trees, split dosages of 350 g N, 175 g P2O5, and 350 g K2O should be applied per plant each year. Zinc, boron, manganese, and calcium deficiencies can be seen on some trees, but these can be fixed by applying the right chemicals by foliage spraying.

Harvesting:

With the exception of the Nilgiris, where the season runs from April to July, apples are typically available for harvest in September or October. Depending on the type cultivated, the fruits reach maturity 130–150 days after reaching full bloom. Fruits change colour, texture, and quality as they mature, and their distinctive flavour develops during this time. When the fruits are harvested, they should be crisp, firm, and uniform. Depending on the type, the skin's colour at maturity can range from yellow to red. However, the ideal time to harvest depends on the quality of the fruit and how long it will be stored. Hand picking is advised now that dwarf rootstock has been introduced, as it minimises bruises from falling fruit during mechanical harvesting (NIIR Board, 2005).

A well-managed apple orchard yields on an average 10-20 kg/tree/year (Bourke *et al.,* 2009). The apple tree starts bearing fruit from fourth year onwards.

Table no 1:- The major constituents of apple fruits per 100g are as below:

Elements	Amount (g)	Elements	Amount (mg)	Elements	Amount (mg)
Water	85.46	Calcium	6.0	Iron	0.12
Protein	0.25	Phosphorous	11.0	Potassium	106
Fat	0.16	Thiamin	0.016	Magnesium	5.0
Sugar	10.38	Riboflavin	0.025	Folate (µg)	3.0
Dietary fibre	2.40	Niacin	0.090	Carotene (µg)	26.0
Carbohydrate	13.80	Vitamin C	4.60	Energy(kcal)	51.0

(Source -USDA 2019-20)

Health benefits of apple:

Apples have earned the moniker "nature's toothbrush" for quite some time. Though eating apples doesn't really clean teeth, biting and gnawing on them stimulates gums, and their flavour increases spit flow, which reduces tooth decay by reducing the amount of microscopic organisms in the mouth. For dwarf rootstock apples, hand picking is advised because it lessens bruises from falling fruit during mechanical harvesting.(Chaudhary *et al.,* 2014).

Quercetin, an anti-cancer substance found in apples, is especially concentrated in red delicious apples. This anti-cancer drug facilitates the safe assembly of the body's natural defences. Quercetin is a type of cell reinforcement found in red apples.(Boyer *et al.,*2004)

Given their low calorie content and ability to satisfy hunger, it should come as no surprise that apples can form a healthy part of a diet that helps people lose weight. Consuming apples and pears has also been demonstrated to assist middle-aged Brazilian women who are overweight in losing weight. (David*et al.,*2015).

Apples can aid with both gastrointestinal ailments, even though blockage and loose stools are two very different conditions. Ulbricht in year 2010, states that the fibre in apples can absorb extra water during diarrhoea and drain water from the colon during constipation.

Eating apples on a regular basis protects a synapse called acetylcholine, which helps to enhance memory. A study also indicated that this apple feature can mitigate the cognitive deterioration experienced by Alzheimer's sufferers (Hyson, 2011).

Conclusions:

The growth of both traditional and fresher assortments has been a beneficial development for Apple development in India. Particular parts of India have seen an increase in the growth of the apple

industry due to government backing and the emphasis on improving planting board standards. Still, it is advised to refer to later sources or rural reports from prominent Indian professionals for the most remarkable and explicit data.

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