

11 DEHYDRATED APPLE PRODUCTION



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1. INTRODUCTION

An apple is a sweet, edible fruit the apple tree produces (*Malus domestica*). Apples are among the most widely cultivated tree fruits in Uttarakhand orchards. They come in various colors, including red, green, and yellow, and can be eaten fresh or used in cooking and baking. Apples are a rich source of dietary fiber, vitamins (especially vitamin C), and antioxidants, making them a healthy addition to the diet. They are also famously associated with the saying, "An apple a day keeps the doctor away," highlighting their nutritional benefits.

Uttarakhand is known for its apple orchards, especially in regions like **Uttar Kashi, Pauri Garhwal, Chamoli, Rudraprayag, Nainital, and Dehradun**. The state produces a significant amount of apples, contributing to local consumption and commercial distribution. The apple season typically runs from **August to November**, with the peak harvest in September and October. This ensures a steady supply of fresh apples during these months.

Here, apples are celebrated for their exceptional quality, sweetness, and vibrant color, particularly the popular **Royal Delicious and Red Delicious varieties**. Grown in high-altitude orchards, these apples have a unique taste and quality. Apple cultivation is a vital economic activity, providing livelihoods for many local farmers and significantly contributing to the state's economy. The apple harvest season is marked by local festivals and fairs, underscoring the cultural importance of apples in the region. Overall, Uttarakhand's apples are highly regarded and sought-after for their locally and beyond premium quality.

An apple dehydration unit in Uttarakhand focuses on processing fresh apples into dehydrated apple slices, which have a longer shelf life and are convenient for various uses. These units typically use advanced dehydration technology to remove moisture from the apples while retaining their nutritional value and flavor. The dehydrated apples can be used in snacks, baking, or as a healthy alternative to fresh apples. By sourcing apples from the lush orchards of Uttarakhand, these units support local agriculture and provide consumers with natural, preservative-free products.

2. PRODUCT AND ITS APPLICATION

Dehydrated Apple fruit is produced by removing moisture from fresh Apple fruit, preserving its flavor, nutrients, and shelf life. The dehydration process can be done using various methods such as air drying, freeze-drying, or sun drying.

As per the Market Overview, the Applications of Dehydrated Apple Fruit are :

1. Snack Food Production

- **Dehydrated Apple slices or chunks** can be packaged as a healthy, ready-to-eat snack. This trend is popular among health-conscious consumers who prefer fruits without preservatives or artificial additives.
- **Fruit Mixes:** Dehydrated Apple can be mixed with other dehydrated fruits (like apples, berries, or bananas) to create fruit snack mixes.

2. Beverage Industry

- **Apple Fruit Powder:** The dehydrated Apple can be ground into a fine powder and used as a beverage flavoring agent. It can make fruit-flavored drinks, energy drinks, or smoothies.
- **Tea and Infusions:** Dehydrated Apple peel or pulp can be used to flavor herbal teas or fruit infusions, offering a tangy citrus taste to the product.

3. Bakery and Confectionery

- **Baked Goods:** Dehydrated Apple can be used in cakes, muffins, cookies, and other baked products to impart a fruity and zesty flavor. It can be used as an ingredient in fruit fillings for pastries or as an addition to bread mixes.
- **Candies and Gummies:** Dehydrated Apple can be rehydrated and used to produce fruit candies, gummies, and other confectionery items, giving them a natural citrus flavor.

4. Cosmetics and Personal Care Products

- **Natural Skin Care:** Dehydrated Apple, especially its peel, can be used in cosmetics and personal care products for its natural acidic properties, which are beneficial for skin exfoliation. It can be used in soaps, face scrubs, and masks to brighten and rejuvenate skin.
- **Essential Oils:** The peel of the Apple fruit can extract essential oils used in aromatherapy or incorporated into lotions and creams for their fragrance and therapeutic properties.

5. Health and Nutraceutical Products

- **Dietary Supplements:** The powder or slices of dehydrated Apple can be used as an ingredient in dietary supplements, especially those focusing on vitamin C, antioxidants, and immune health. This is popular for vitamin-rich capsules or powders.
- **Smoothie Mixes and Health Bars:** Dehydrated Apple can be added to health bars, protein bars, or smoothie mixes for added nutrition and flavor.

6. Food Preservation and Ingredient for Cooking

- **Culinary Uses:** Dehydrated Apple can be used as an ingredient in sauces, soups, or marinades, providing a natural tangy and citrus flavor.
- **Preserves and Jams:** Apple fruit can be rehydrated to make fruit jams, jellies, or preserves, preserving the flavor for extended periods.

3. DESIRED QUALIFICATIONS FOR PROMOTER

A promoter should ideally possess horticulture, agriculture, or food processing knowledge and skills to succeed in the dehydrated Apple fruit enterprise. Specific qualifications may include:

1. A background in agriculture, botany, food science, or a related field.
2. Practical experience in horticulture, especially vegetable cultivation and post-harvest management.
3. Training in food processing, specifically in dehydration technologies.
4. Business management skills for running a processing facility.
5. Knowledge of local market trends and export requirements for dried fruits.

Additionally, a commitment to sustainable farming practices and the willingness to keep updated on fruit and vegetable processing technology advancements will be beneficial.

4. BUSINESS OUTLOOK AND TRENDS

Setting up a dehydrated Apple fruit production unit in Uttarakhand offers a promising business opportunity due to the state's ideal agricultural climate for citrus farming and the growing demand for natural, healthy products. Uttarakhand's favorable weather conditions provide easy access to fresh Apple fruits, reducing transportation costs and ensuring a steady supply of high-quality raw materials. With the increasing consumer shift towards healthy snacks and functional foods, dehydrated Apple, rich in vitamins, fiber, and antioxidants, fits well into trends such as wellness, clean-label products, and convenient on-the-go options. Apple's rich Vitamin C content makes it a valuable ingredient for health supplements, smoothies, and health bars, tapping into the nutraceutical market.

The dehydrated fruit market also benefits from a rise in sustainability-conscious consumers, as dehydrating fruit helps extend shelf life and reduce food waste. There is significant export potential for dehydrated Apple in international markets, especially in regions with high demand for dried fruits and health-conscious products. In the food and beverage industry, dehydrated Apple can be used in various products such as fruit-flavored drinks, energy drinks, bakery goods, and herbal teas, while innovations in drying technology ensure high-quality output. As consumer interest in transparency and organic certifications grows, the business can stand out by offering natural, preservative-free products, with the potential for domestic and international growth.

5. MARKET POTENTIAL AND MARKETING ISSUES

The market potential for dried apples in Uttarakhand is substantial, driven by increasing consumer demand for natural and health-oriented products. Apple is widely used in food and beverage, pharmaceuticals, cosmetics, and nutraceuticals. The primary reason for substantial market potential is as follows:

□ **Agricultural Region:** Uttarakhand's favorable climate for apple cultivation makes it ideal for setting up a dehydration unit, ensuring a continuous supply of fresh Apple fruits.

□ **Export Opportunities:** Dehydrated apples can also be exported to international markets, especially to countries where citrus products are in demand in the food, beverage, and cosmetic industries.

□ **Health-Conscious Consumer Trends:** With increasing demand for healthy snacks and natural ingredients, dehydrated Apple has the potential to cater to the growing health and wellness market.

Marketing issues to consider:

- **Seasonality of Apple Fruit:** Apple fruit is seasonal, which could create challenges in ensuring a consistent supply throughout the year. However, this can be addressed through proper supply chain management and cold storage for fresh fruit before dehydration.
- **Quality Control:** Ensuring the dehydrated apple fruit maintains its flavor, color, and nutritional value during dehydration.
- **Storage and Packaging:** Proper storage and packaging ensure a long shelf life and prevent spoilage.
- **Competition:** While the market for dehydrated fruits is growing, it is important to differentiate the product in quality, branding, and innovative packaging to stand out from competitors.
- **Branding and Promotion:** Building a brand in the health food sector is critical, and proper marketing strategies targeting health-conscious consumers and exporting nations will be necessary.

Marketing Strategy

Manual and sun-drying methods have been in vogue for dehydration for a long time, but production is limited, and quality is not up to the mark. Hence, mechanically dehydrated apples have become very popular. Restaurants, eateries and dhabas, clubs, caterers, the food processing industry, and pharmaceutical companies are the primary consumers. There are perfect export markets as well, but the contemplated capacity of the project does not warrant this.

6. RAW MATERIALS REQUIRED

The all-important raw material is fresh apple fruits. The requirement during the season, even at 100 %, will be 20 tons, and procurement should not be a problem. Bags made from food-grade plastic shall be required for inner packing and large-size bags for outer packing.

- Fresh Apples
- Water
- Preservatives (Optional)
- Polythene/Vacuum Sealed Bags

Apple to be of fresh and good quality

7. APPLE FRUIT DEHYDRATING PROCESS

The processing method for dehydrated Apple fruit is as follows:

A. Selection and Cleaning

- **Selection:** Fresh, ripe Apple fruits are carefully selected, ensuring they are free from blemishes and damage.
- **Cleaning:** The fruits are thoroughly washed to remove dirt, pesticides, or any residues on the skin. This step is crucial for food safety and hygiene.

B. Peeling (Optional)

- Depending on the desired end product, the **peel** may be removed. Some production units may dehydrate the whole fruit, including the peel, for added flavor and nutritional benefits, while others may focus on the pulp.
- If peeling is done, **manual or mechanical peelers** are used.

C. Slicing

- After cleaning and peeling (if applicable), the **Apple fruits** are sliced into uniform pieces, typically thin **rings** or **half-moon slices**. The thickness of the slices is essential to ensure even drying.

D. Blanching (Optional)

- **Blanching** is a short heat treatment (boiling or steaming) applied to preserve the fruit's color, flavor, and nutrients. It helps stop enzymatic activity that could degrade the quality of the dehydrated fruit.
- Some units may skip this step if they prefer a more natural or raw product.

E. Dehydration

- The sliced Apple fruit is dehydrated using one of the following methods:
 - **Sun Drying:** This is a traditional method where slices are laid out in the sun to dry. However, this method is slower and requires favorable weather conditions.
 - **Air Drying:** Involves drying the fruit in a controlled environment using hot air to circulate the slices. This method is more controlled and efficient than sun drying.
 - **Freeze Drying:** The fruit is frozen, then the moisture is removed through sublimation. This method retains the most nutrients, flavor, and texture but is more expensive.

- **Hot Air Drying:** Using machines that blow hot air at specific temperatures (usually 50-70°C) removes moisture from the fruit slices, reducing their weight and volume.

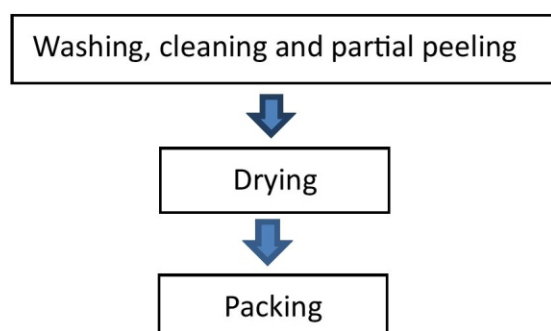
F. Cooling

- After dehydration, the dried Apple slices can cool to room temperature. This helps them stabilize and reduces any residual moisture that could lead to spoilage.

G. Packaging

- The dehydrated Apple slices are then carefully packed in **airtight packaging** (such as vacuum-sealed bags or food-grade plastic pouches) to maintain freshness, flavour, and shelf life.
- Packaging also includes labeling with product details, such as nutritional information, expiration date, and origin.

The process flow chart is as follows:



8. MANPOWER REQUIREMENT

Sr. No	Particulars	No.	No of month in year	Wages/Salaries per month (Rs. In Lakhs)	Annual Expense (Rs. In Lakhs)
1	Self-employed (Owner)	1	-	-	-
2	Skilled Labor (Processing)	2	6	0.1	0.6
3	Semi-skilled Labor	3	6	0.06	1.08
4	General Labor (Packaging)	1	8	0.1	0.8
Total					2.48

9. IMPLEMENTATION SCHEDULE

Sr. No.	Activity	Time Required (in months)
1	E M Registration & approval	1
2	Financial/Loan from Banker or Financial Institutions	2
3	Power connection/Building construction Six months	6
4	Machinery procurement & Trial run.	2
5	Recruitment of Staff & Labour	1
5	Actual commercial production	1
Total (some activities shall run concurrently)		13

10. COST OF PROJECT

Sr. No	Particulars	Annual Expenses (Rs. in lakhs)
1	Land	-
2	Building (Rented)	0.30
3	Plant & Machinery	1.65
4	Equipment and Furniture Exp.	0.80
5	Misc. Fixed Asset	0.02
6	Preoperative & Preliminary Exp.	0.05
7	Working Capital	44.64
Total Project Cost		47.46

11. MEANS OF FINANCE

Sr. No.	Particulars	Annual Expenses (Rs. in lakhs)
1	Promoter's contribution	18.99
2	Bank Finance	28.48
Total		47.46

LIST OF MACHINERY & EQUIPMENT

A. MACHINERY

Sr. No	Particulars	Unit	Price per Unit (Rs. in lakhs)	Total Amount (Rs. in lakhs)
1	Farming Tools	0	0.050	0.050
2	Fruit Peeling Machine (Automatic)	2	0.500	0.500
3	Electrically-operated Tray Drier-48 trays	1	0.700	0.700
4	Weighing-scales, sealing machine, etc.	1	0.200	0.200
5	Washing Tank			0.200
Total Amount				1.450

B. FURNITURE & EQUIPMENT

Sr. No	Particulars	Unit	Price per Unit(Rs. in lakhs)	Total Amount (Rs. in lakhs)
1	Chair, Table and Work Tables	-	0.00	0.30
2	Storage cabinets, bins, freezer etc.			0.05
Total Rs.				0.80

The availability of raw materials and equipment from local manufacturers is a promising advantage for the entrepreneur. Choosing the right mix of products and suitable machinery and tooling to facilitate modern and flexible processes is essential. Here are some of the suppliers of business equipment an entrepreneur can consider:

1. Shiv Shakti enterprises

No. 666/2, Street No. - 8, Chander Lok, Shahdara,
Delhi, India

2. Super Engineering Works

C-263, C Block, Sector 10, Noida, Uttar Pradesh 201301

3. Microtech Engineering

Snap Story, Block V, Krishan Vihar, Delhi, 110083

4. B.S. Engineering works

Superior Selections, Block RZ, Khayal, Vishnu Garden, New Delhi, Delhi, 110018

Besides these, online platforms such as India Mart, Trade Mart, Amazon, Flipkart, etc., can also be explored for online ordering.

12. SALES REALISATION

Sr. No	Product	Sales in Percentage	INR
1	Dehydrated Apple	25.0%	15750000
Total		100.00%	15750000

13. PROFITABILITY CALCULATION

Sr. No	Particulars	Annual Expenses (Rs. in lakhs)
A.	Sales realisation	157.50
B.	Cost of production	
i)	Raw materials	55.20
ii)	Utilities	0.22
iii)	Manpower Cost (Salaries/wages)	4.88
iv)	Administrative expenses	0.07
v)	Packaging Cost	0.30
vi)	Material Lost Cost	0.20
vii)	Selling & distribution expenses	0.06
viii)	Repairs & maintenance	0.00
ix)	Rent	0.30
x)	Interest	3.44
xi)	Misc. expenses	0.00
	Total (B)	64.67
	Gross profit/loss (A – B)	92.83
	Less: Depreciation	0.29
C.	PBIT	92.55
D	Income-tax	-
E	Net profit/loss	92.55
F.	Repayment (Annual)	-3.01
G	Retained surplus (E-F)	95.56

14. BREAK-EVEN ANALYSIS

Fixed cost	
Land & Building Rent	0.30
Depriciation	0.29
Interest	3.44
Manpower	1.46
Total Fixed cost	5.48
Variable cost	
Raw materials	55.20
Utilities	0.22
ManPower	3.42
Administrative expenses	0.07
Selling & distribution expenses	0.06
Total Variable cost	58.97
Contribution margin	63%
Break-Even Point in Value	8.71

15. STATUTORY/GOVERNMENT APPROVALS

For a dehydrated kiwi business, the following licenses and approvals are required:

1. FSSAI License: Ensure compliance with food safety regulations.
2. Trade License: Obtain from the local municipal authority.
3. GST Registration: For the sale of goods and services.
4. MSME Registration: To avail of government subsidies and support.

16. TRAINING CENTERS AND COURSES

Entrepreneurs looking to enter kiwi farming and dehydration can pursue relevant courses at the following institutes:

1. FCI Institute of Management, Dehradun, Uttarakhand.
2. National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Haryana.

Uttarakhand farmers can capitalize on the growing demand for dehydrated fruits and secure a sustainable and profitable business by cultivating kiwi and engaging in dehydration.

The Swayam portal (link: <https://swayam.gov.in/>) can also be accessed for enhanced learning on business commerce, accounting, production, marketing, and areas of entrepreneurship.

Entrepreneurship programs that help run businesses successfully are also available from institutes like the Entrepreneurship Development Institute of India (EDII) and its affiliates all over India.

Disclaimer

Only a few machine manufacturers are mentioned in the profile, although many are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.