HORTICULTURAL PLANTS OF INDIA: ITS ASPECTS AND PROSPECTS

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CERTIFICATE

Certified that dissertation entitled **"Horticultural plants of India: A brief review**" has been carried out entirely by **Ketaki Das**, student of SEM VI, B.SC. (Gen) in the department of Botany, M.U.C. Women's College, Burdwan University under my supervision. It is further certified that the candidate has fulfilled all the conditions necessary for the partial fulfillment of her B.SC. (Gen) degree achievement under this University and this work has not been submitted anywhere for any other degree to the best of my knowledge.

Place: Purba Bardhaman

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Dr. Irani Biswas

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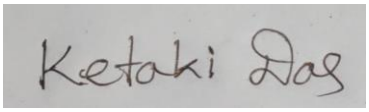

(Ketaki Das, Sem VI , Gen)

CONTENTS

INTRODUCTION

‘Hortis’ is Greek for ‘Grass’, ‘Culture’means ‘Growing’. So Horticulture means ‘Growing grass’. However, today, horticulture is not only about growing grass but all other plants. Horticulture is a big business.

Horticulture is a science, as well as, an art of production, utilization and improvement of horticultural crops, such as fruits and vegetables, spices and condiments, ornamental, plantation, medicinal and aromatic plants.

It also includes plant conservation, landscape restoration, soil management, landscape and garden design, In contrast to agriculture, horticulture does not include large-scale crop production or animal husbandry.

Horticultural crops require intense care in planting, carrying out intercultural operations, manipulation of growth, harvesting, packaging, marketing, storage and processing. India is the second largest producer of fruits and vegetables in the world after China. In India about 55-60 per cent of the total population depends on agriculture and allied activities. Horticultural crops constitute a significant portion of the total agricultural produce in India. They cover a wide cultivation area and contribute about 28 per cent of the Gross Domestic Product (GDP). These crops account for 37 per cent of the total exports of agricultural commodities from India.

Horticulturists apply their knowledge, skills, and technologies to grow intensively produced plants for human food and non- food uses and for personal or social needs. Their work involves plant propagation and cultivation with the aim of improving plant growth, yields, quality, nutritional value, and resistance to insects, diseases, and environmental stresses. They work as gardeners, growers, therapists, designers, and technical advisors in the food and non- food sectors of horticulture. Horticulture even refers to the growing of plants in a field or garden.

BRANCHES OF HORTICULTURE8

Horticulture is perhaps the most important of agriculture. It is further divided into four different branches .

Pomology

The term is derived from Latin words poma and logus. Poma means ‘fruit’ and logus means ‘study, knowledge or discourse’. It can be defined as a branch of horticulture, which deals with the scientific study of fruit crops.

Olericulture

The term is derived from latin words olerus meaning ‘vegetables’ and cultura meaning ‘cultivation’. It can be defined as a branch of horticulture, which deals with the scientific study of vegetables crops.

Floriculture

The term floriculture is derived from latin words florus and cultura. Florus means ‘flower’ and cultura means ‘cultivation’ scienti. It can be defined as a branch of horticulture, which deals with the study of flowering and ornamental crops. Landscaping is the art of beautifying a piece of land using garden designs, methods and plant material. Professionals who do landscaping are called ‘Iandscape architects’.

Post-harvest technology

It is a branch of horticulture, which deals with the principles and practices of handling, packaging and processing of harvested crops to increase their storage life and availability.

Vegetables crops are different from fruit crops.

Table:1 Difference between fruits and vegetables

Fruit	Vegetables
Most fruit plants are perennials.	Most vegetables are annuals.
Fruit plants are generally woody in nature.	Vegetables plants are, generally, herbaceous and succulents.
They are commercially propagated asexually.	They are commercially propagated sexually (by seed).
Fruits are mostly consumed fresh after ripening.	Most vegetables require cooking for consumption.

PHOTOGRPH OF FRUITS AND VEGETABLES

Classification of vegetables crops

Based on the nature of plant (stem)

(a) Herbaceous and succulents: Leafy vegetables

(b) Shrubs: Brinjal, chilli, tomato, etc.

(c) Trees: Drumstick, jackfruit, etc.

(d) Vines: Cucurbits, etc.

Based on the life span (from seed to seed)

(a) Annuals: The life span of annual plants or annuals is a season or year, e.g., brinjal, chilli, cabbage, cauliflower, cucurbits, tomato, leafy vegetables, etc.

(b) Biennials: The life span of biennials is of two seasons or two years, e.g. onion, radish, carrot, etc.

(c) Perennials: The life span of perennial plants is more than two years, e.g., drumstick (moringa), asparagus (shatawari), pointed gourd (parwal), etc.

Based on the method of commercial propagation

(a)Sexually propagated (by seed): Brinjal, chilli, cauliflower, cabbage, cucurbits, tomato, leafy vegetables, etc.

(b)Asexually propagated (vegetative parts): Asparagus, dioscorea, potato, sweet potato, onion, garlic, taro, yam, etc.

- Cuttings: Asparagus
- Bulbs: Onion, garlic
- Rhizomes: Colocasia, ginger, coleus
- Tubers: Potato, sweet potato

Based on the method of planting

(a)Directly sown plants: Okra, leafy vegetables, carrot, radish, peas and beans.

(b)Transplanting: Tomato, brinjal, chilli, cauliflower, cabbage, onion, potato, sweet potato, cassava, pointed gourd, etc.

(c)Crops grown from underground parts

- Root vegetables: Radish, carrot, turnip, beetroot.
- Rhizome: colocasia, ginger
- Bulb: Onion, garlic
- Tuber: Potato, sweet potato, cassava and yam

Based on intercultural practices

(a)Solanaceous crops: Tomato, brinjal, chilli, bell pepper, potato.

(b)Cole crops: Cabbage, cauliflower, knol-khol, broccoli and Brussels sprouts.

(c)Leafy vegetables: Spinach, methi, lettuce and chaulai (amaranthus)

(d)Pods or capsules: pea, cowpea, cluster bean,okra

(e)Cucurbits: Gourds, melons, cucumber, pumpkin

(f)Root crops: Carrot, radish, turnip, beetroot

Based on the climatic requirements

(a)Temperate vegetables: Radish, potato, cabbage, cauliflower, carrot, knol-khol, broccoli, etc.

(b)Tropical and subtropical vegetables: Watermelon, musk melon, cucumber, tomato, brinjal, chilli, etc.

Based on the season of growth

In India, seasonal or annual vegetables can be classified according to their season of growth. Season of growth is the period in which the climatic conditions are favourable for the growth and production of a crop.

(a)Kharif season vegetables: These may also be called rainy season crops. These vegetables require hot and humid climate. The season tentatively starts from 7th June and lasts till 6th October every year. The sowing of seeds may be undertaken from mid-May to late July. Vegetables, like okra, cowpeas, cluster beans, etc., are examples of Kharif vegetables.

(b)Rabi or cool season vegetables: These may also be called cool or winter season crops as these vegetables require low temperature for growth. The season tentatively starts from 7th October and lasts till 6th February. The sowing of seeds may be undertaken from mid-September to late October. Vegetables, like peas, radish, carrot, cauliflower, cabbage, knol-khol, leafy vegetables, etc., are examples of Rabi vegetables.

Summer or warm season vegetables: The season tentatively starts from 7th February and lasts till 6th June. The sowing of seeds may be undertaken from mid-January to late February. These crops require hot and dry climatic conditions for better growth and maximum production. Cluster bean, musk melon, cucumber watermelon, etc., are summer season vegetables.

Based on plant part used as vegetables

(a)Stem and leaves: Cabbage, lettuce, spinach, methi, coriander, amaranthus, etc.

(b)Flowers: Broccoli (head ‘flower buds’), cauliflower (curd ‘pre-floral stage’) etc.

(c)Fruits: here are various stages where the fruits of vegetables crops can be harvested for consumption, such as

- Ripened fruits: Watermelon, musk melon, tomato, etc.
- Immature and tender fruits: Cucumber, bottle gourd, bitter gourd, ridge gourd, okra, brinjal, green chilli, cowpea, French beans, dolichos beans, etc.

(d)Seed: Peas, etc.

(e)Underground parts of plant

- Taproot: Tapering root growing vertically downward, e.g., carrot, radish, etc.
- Bulb: A fleshy leaved storage organ in some vegetables sending adventitious roots downward and leaves upward, e.g., onion, garlic, etc.
- Tuber: Thick, short and rounded underground stem with modified nodes and buds, e.g., potato, sweet potato,etc.

Olericulture And Its Importance In Human Nutrition

Olericulture is a branch of horticulture, which deals with the study of cultivation of vegetables crops. The term vegetable is applied to edible herbaceous plants or parts, commonly used for culinary purposes. It may be grains as in maize cobs (sweet corn, baby corn), peas, bulbs, corms, rhizomes, roots and tubers, leaves, pods, fruits or curds, mushroom, etc.

Possibilities of vegetable cultivation in India

More crops per year

Vegetables crops grow fast and require only a few months to mature. Therefore, a number of crops can be cultivation in a year.

Profitability

The yield of vegetables per unit area is higher than cereals. In some cases, it is reported 4-5 times high, so vegetables can profitably grow on small and marginal holdings. This enables increase in the income of small and marginal farmers.

Utilisation of land

Vegetables can be cultivated on a small scale and for a family even in the backyard of a house. It ensures the utilisation of waterland, household waste and wastewater.

Growing crops in uncertainty of weather

Due to global warming and increase in pollution, there are sudden changes in climatic conditions. Short duration vegetables can be grown effectively because a crop standing for long period will suffer more from climatic adversities.

Employment

Vegetables are labour-intensive crops and can be grown throughout the year. This provides employment opportunity to agricultural labourers in rural areas.

Advanced techniques of cultivation

Polyhouse and shade-net house techniques of vegetables cultivation enable to get quality produce with maximum returns from a small area. Exotic vegetables with special cultural practices can be grown in such structures and more income can be generated.

Seed industry

Seed is an important factor governing the production of vegetables. Quality sees production is a technical matter, which requires specific environmental conditions and technical knowledge. Quality seeds increase the crop yield, and subsequently, the income of farmers. Exporting vegetables seeds to countries in South East Asia and Africa helps in foreign exchange.

Increasing irrigation facilities

Awareness about water conservation and construction of dams, canals, ponds and other water bodies to be used as sources of irrigation are increasing by the day. Adequate irrigation facility ensures growing vegetables crops throughout the year.

Better transport facilities

The country's transport infrastructure is improving, and interior and remote areas are gradually getting connected with highways and railways. This ensures early and better transportation of the produce to urban and remote markets.

Skilled manpower

Cultivators, these days, are more skilled. Farmers are educated and trained in innovative practices and new scientific techniques. Their problems are effectively solved through various agencies, such as universities, radio, television, mobile phones, extension workers and other digital means.

Government assistance

The government is emphasising on the development of horticulture. Several schemes and financial assistance regarding infrastructure, irrigation, greenhouse and other farm inputs are being provided to farmers through National Horticulture Mission (NHM), National Horticulture Board (NHB), etc.

Importance of vegetables in human diet

Vegetables constitute an important of the human diet. They are natural sources of vitamins and minerals, like calcium, phosphorus and iron, carbohydrates and proteins. These nutrients are necessary for growth and build resistance against diseases. Hence, vegetables are termed as 'protective foods. Vegetables increase the palatability of food and eliminate acidity developed due to the consumption of non-vegetarian foods. They are a valuable source of roughages, have a higher digestibility coefficient and remove constipation. Dieticians recommend that the balanced diet of an adult should consist of 300g of vegetables per day.

Table:2 Importance of vegetables in human diet

Nutrients	Vegetables	Importance	Deficiency symptoms
Vitamin A (Bita-carotene)	leaves of turnip, methi, beetroot, sweet potato, green chilli, carrot roots, cabbage, green onion, spinach, tomato, lettuce	essential for the growth of body, healthy eyes and skin	retardation of growth, dry and flaky skin, drying of tear glands, night blindness, kidney Stones, conjunctivitis, etc
Vitamin B (riboflavin)	all green leafy vegetables	useful for skin, digestibility and growth	pellagra, ulcer of the mouth, cracked, lips, fatigue, skin disorders, loss of appetite, glossy tongue
Vitamin C (ascorbic acid)	cabbage, tomato, methi, spinach, cauliflower, green chillies, bitter gourd, sweet potato, etc	essential for healthy veins and blood circulation	scurvy, bleeding of gums, tooth decay, heart attack, pain in the gum and joint pain, delay in healing of wounds, weak bones.
Vitamin D (calciferol)	all green vegetables	essential for healthy bones and teeth, helps in calcification	rickets, dental disease
Vitamin E (tocopherol)	cabbage, lettuce, germinated beans, peas, etc.	anti-ageing vitamin, essential for reproduction, fertility and hair	sterility, hair fall and baldness, anaemia in infants
Calcium	carrot, cabbage, cauliflower, peas, onion, cowpeas, tomato, spinach and other green vegetables	essential for building resistance against diseases, growth and	rickets, trouble in child birth, osteoporosis, irritability, retardation of growth

Phosphorus	potato, carrot, spinach, methi, tomato, beans, cowpeas, cucurbits, etc.	essential for different intra-cellular activities, helps in cell division and multiplication oxidation of carbohydrates and growth of bones	weakness, retardation of normal growth
Iron	Spinach, cabbage, cowpeas, peas, beans, tomato etc	important constituent of red blood corpuscles, carries oxygen to various parts of the body	anaemia, lip, eye and nail diseases
Carbohydrates	radish, carrot, sweet potato, potato, tapioca, watermelon, musk melon, beetroot, etc	provide energy for normal functioning of body and aid different biochemical activities in a cell	retardation of growth, indigestibility, diseases of skin, hair and bones
Fats	seeds for chilli, brinjal, radish, Tomato, coriander, cucurbits, etc	reserved food material, and and help in the lubrication of various tissues and organs	weakness, hinder joint mobility
Proteins	spinach, cabbage, radish, beans, peas	constitute the chief solid matter of organs and muscles and are the main constituent of skin, hair, nails, bones, blood cells and serum; contain amino acid, which in necessary for the formation and maintenance of body tissues, and help in the neutralisation of acids produced during digestion, thereby, improving digestibility	retardation of growth, hair and bones, diseases of skin, indigestibility

PRESENT STATUS OF HORTICULTURAL CROPS IN INDIA

According to the data provided by the Government of India for 2016-17 horticulture crops in India are being cultivated in 24 million hectares, which is about 7 per cent of India's total cropped area. The annual horticultural produce is estimated around 295 million tonnes, which includes 175 million tonnes of vegetables million tonnes of fruits in 2016-17.

India is the largest producer of okra (lady's finger). Among vegetables, India ranks second in the production of potato, onion, cauliflower, brinjal and cabbage. In fruits, it is the largest producer of banana, mango, guava, lemon and papaya. Mango, walnut, grapes, banana and pomegranate are the major fruits exported, while onion, okra, bitter ground, green chilly, mushroom and potato have more exotic demand. Fruits and vegetables are mostly exported to the UAE, Bangladesh, Malaysia the Netherlands, Sri Lanka, Nepal, the UK and Saudi Arabia.

Table 3. Important horticultural crops and their growing regions in India

State	Major Horticultural crops (s)
Northern	
Haryana	bottle gourd, marigold
Himachal Pradesh	apple, Potato
Jammu and Kashmir	apple
Punjab	citrus fruits
Uttarakhand	potato
Uttar Pradesh	mango, banana, potato, sweet potato, watermelon, bottle gourd, jasmine
Rajasthan	Pomegranate, tuberose, jasmine, onion
western	
Chhattisgarh	bottle gourd, rose
Goa	coconut, arecanut, cashew nut
Gujarat	banana, papaya, pomegranate, rose, marigold, sapota, potato, tomato, onion
Maharashtra	mango, banana, grapes, citrus fruits, sapota, pomegranate, chilli, onion, rose, chrysanthemum, tuberose, marigold

Madhya Pradesh	citrus fruits, papaya, pomegranate, bottle gourd, sweet potato, onion, potato, chrysanthemum, tomato, marigold, chilli
Southern	
Andhra Pradesh	mango, banana, grapes, citrus fruits, papaya, sapota, pomegranate, chilli, coconut, chilli, watermelon, tomato, jasmine, tuberose, marigold
Karnataka	mango, banana, grapes, papaya, sapota, pomegranate, coconut, rose, jasmine, onion, watermelon, tomato, chilli, marigold, chrysanthemum, tuberose
Kerala	banana, coconut, sweet potato, jasmine, chrysanthemum
Tamil Nadu	banana, papaya, sapota, coconut, jasmine, chrysanthemum, tuberose
Telangana	mango, citrus, fruits, tomato
Eastern Andaman and Nicobar Islands	coconut
Bihar	mango, Chilli, potato, onion, bottle gourd
West Bengal	oconut, pcotato, sweet potato, watermelon, rose, marigold
Odisha	coconut, sweet potato, watermelon, bottle gourd
North- eastern	
Arunachal pradesh	turmeric, ginger
Assam	banana, papaya, coconut, pomegranate, tuberose
Meghalaya	papaya, ginger, arecanut
Sikkim	ginger
Tripura	Papaya, arecanut, turmeric

INSTITUTE OF HORTIULTURE

The first horticultural research institute in the country under the Indian Council of agricultural Research (ICAR), was established on 5th September 1967 at new Delhi. The institute has its headquarters in Bengaluru, Karnataka, which was the premises the fruits research station.

Table:4 some horticultural institute name

Name of Institute	Place	Year of Establishment
Fruit research center	Conoor, Karnataka	1916
Central horticultural Experimental center	Karnataka	1947
Central coconut research center	Kasargod, Kerala	1943
Indian institute of Horticultural research center	Bangalore, Karnataka	1968
Central mango research center	Luknow, UP	1972
Central horticultural Experimental center	Gujarat	1979
Central horticultural Experimental center	Ranchi, Bihar	1979
Indian institute of spices Research center	Kerala	1986
Indian institute of vegetables Research center	Uttar pradesh	1999
Central potato research institute	Bihar	1949
Central institute for temperate horticulture	Jammu and kashmir	1997

PROSPECTS OF HORTICULTURAL CROPS IN INDIA

Diverse agro-climatic conditions in India ensure the production of all type of fresh fruits, vegetables and medicinal plants in different parts of the country. Health consciousness among people is increasing. Majority of the population in India is vegetarian. As a result, the demand of fruits and vegetables is also high. The production of horticultural commodities is far less as compared to the existing demand in the country. So, there is vast crops to produce more horticultural crops. Major areas in the country are suitable only for horticultural crops, like mango, tea, coconut and arecanut, as they are non-arable, rocky, stony, marshy, undulated and sloppy.

There has been an increase in irrigation facilities but there are crops, which even with little watering, can survive. One only needs to ensure adequate water management. Some dry land horticultural crops, like jamun, ber, tamarind, wood apple, custard apple, ramphal, etc, can be grown on rainfed land also. Compared to other countries, agricultural labour and other agricultural inputs are far cheaper and easily available here, which reduce the cost of production and generate more profit. High return, coupled with government assistance, through various schemes and financial aid, attract the rich and poor, trained and educated people towards horticulture. This leads to the use of intensive methods and improved technology in the production of horticultural crops. Awareness of storage and processing methods also increase the availability of the produce, job opportunity and income generation.

EMPLOYMENT OPPORTUNITIES IN HORTICULTURE

The horticultural industry offers a variety of jobs, both directly and indirectly and indirectly. Many jobs require knowledge and training in horticulture. The level of training could be vocational or at the college level. The nature of work may be indoor or outdoor. Intense manual labour or paperwork in office may be involved. The following are the identified categories of jobs that require varying degrees of familiarity with horticulture:

Nursery operation

(a)Nursery manager (coordinates the entire nursery operations)

(b)Propagator (develops quality planting material)

(c)Field supervisor (supervises and plans fieldwork)

(d)Plant technician (advises and provides guidance on plant care)

(e)Salesperson (works on the promotion and sale of plant material)

Turf grass operation

(a)Landscape technician (establishes and maintains landscape)

(b)Golf course architect (designs a golf course)

(c)Golf course superintendent (supervises the construction and maintenance of the golf course)

Crop production

(a)Farm manager (manages the horticulture farm)

(b)Crop grower (produce vegetables, fruits and flower)

Florist operation

(a)Floral designer (creatively arranges flowers)

(b)Store manager (manages and supervises the store of the farm)

(c)Plant rental supervisor (manages plants and pots, and does floral arrangements on rent)

Education

(a)Teacher/trainer (teaches horticulture in formal or informal system)

(b) Researcher (conducts research to develop new products and varieties)

(c)Extension person (disperses innovative techniques and methods among people)

Industrial operation

The horticultural industry has spawned a number of supporting or service industries, including the following:

Developer or producer

Agro-chemicals

The horticulture industry depends on a variety of chemicals, including fertilisers, pesticides and growth hormones. These chemicals are called agro- chemicals.

Farm machinery

Machinery, tools and implements are required for preparing the land, planting, cultivation, spray, harvest, store and packaging. Engineers design and construct the tools and machinery required for extensive and intensive production of horticultural plants. Home garden versions of some of these machineries and equipment are also available.

Distributors

Horticultural products need to be transported from the areas of production to nearby and distant markets, and ultimately, to consumers. Because of their highly perishable nature and in order to retain their quality for a long duration, horticultural products require special care and handling in transportation. It requires special personnel to look after this aspect.

IMPORTANCE OF HORTICULTUE

Horticulture crops perform a vital role in the Indian economy by generating employment, providing raw material to various food processing industries, and higher farm profitability due to higher production and export earnings from foreign exchange.

(a)Horticulture crops are a source of variability in farm produce and diets.

(b)They are a source of nutrients, vitamins, minerals, flavor, aroma, dietary fibres, etc.

(c)They contain health benefiting compounds and medicines.

(d)These crops have aesthetic value and protect the environment. (e)The comparative production per unit area of horticultural crops is higher than field crops, e.g., paddy crop gives a maximum yield of only 30q/ha, while banana crop gives 300-450 q/ha, and grapes 90-150 q/ha.

(f)Fruit and plantation crops can be cultivated in places where the slope of land is uneven or undulating. Mango and cashew nut are cultivated on a large scale in hilly and hill back area of the konkan region.

(g)The crops are useful for cultivation in wasteland or poor quality soil.

(h)Such crops are of high value, labour intensive and generate employment throughout the year.

(i)Horticultural produce serves as raw material for various industries, such as processing, pharmaceutical, perfumery and cosmetics, chemical, confectionery, oils and paints, etc.

(j)They have national and international demand and are a good source of foreign exchange

ADVANTAGES AND DISADVANTAGES OF HORTICULTURE

Horticulture is the science and art of the development, sustainable production, marketing, and use of the high-value, intensively cultivated food and ornamental plants. Horticultural crops are diverse; they include annual and perennial species, delicious fruits and vegetables, and decorative indoor and landscape plants.

ADVANTAGES

- Reduce pollution
- Reduces temperature
- Provides higher employment opportunity
- Acts as recreational areas
- Provides fresh air
- Gardening provides a source of physical exercise
- Gardening can provide nutritious food
- High potential for foreign exchange earnings.

DISADVANTAGES

- Costly procedure
- High maintenance
- Requires huge labor force
- Skilled labor and techniques are necessary
- Hectic and hard procedure
- Selecting the right seed
- Lack of space
- Lack of adequate water resources
- Sometimes costly for people

IMAGES OF SOME HORTICULTURAL FRUITS, FLOWER, VEGETABLES AND SPICES

Musa sp. (Banana)

Brassica juncea (Mustard)

Solanum melongena (Brinjal)

Dellis perennis (Daisy)

Mangifera indica (Mango)

Solanum tubersum (Potato)

Piper nigrum (Black pepper)

Helianthus sp. (Sunflower)

Conclusion

Horticultural research has a major role to play in the improvement of the horticultural industry in India. For the farmers to produce good quality fruits and vegetables for the export market, research should focus on the identification of high-yielding varieties adapted to different agroecological zones; availability of good quality planting material of the selected varieties and development of production and post-harvest technologies.

There is a need to diversity exports, train producers and conduct market studies. And shorter distance to the market, less post harvest losses and higher profitability of horticulture increased the farmers interest in horticulture and therefore their participation in the extension of improved farming practises.

Farmers lack in proper marketing. Govt. should take the initiative to make them aware of market intelligence and technological services.

In India major amount of horticultural crops are wasted so facilities like cold storages, were houses should be increased. And technology development and seed production systems have to improved.

There is a need to develop proper supply chain model which may play an important role in increasing the shelf life and increase the farmer income, generate employments opportunities for the local peoples, and improve the livelihood of the farmers which leads to the development of Indian.

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