CHAPTER - III

V E G E T A B L E S

INTRODUCTION :

All plants are vegetables. But the term vegetable is generally applied to the edible plants which store up food in their roots, stems, leaves and fruits. the nutritive value of vegetables is due to the presence of mineral salts and vitamines. On the basis of the recommendation of Medical Research, Department of West Bengal minimum requirement of vegetable is 10 gm, per head per day. Due to seasonal in nature, accurate figures of area and production of vegetables are very much difficult to assess. A fair idea can be achieved from Table 3.1. District-wise area under different vegetables excluding potato (cash crop) which is credited to be grown over an area of 84,000 ha in the State. (Appendix - V)

Table-3.1

Concentration of vegetable production in West Bengal

Category	% to total area	No. of dist.	Name of the districts with P.C.covered by vegetables area to total area.
Very high	> 65	6	Purulia (88.7), Bankura(88.4), Barddhaman(78.3), Birbhum(77.9), Darjiling(67.9), Kochbihar(65.1), Hugli(60.5), Haora(59 4).
High	50-65	2	Uttar Dakshin Dinajpur(48.8),
Moderate	35-50	3	Jalpaiguri(46.7), Nadia(45.3).
Low	20-35	3	Murshidabad(34.0), Medinipur(34.0), Uttar & Dakshin 24 Parganas(32.1),
Very low	< 20	1	Malda (11.8).

Table 3.1 shows vegetable producing areas in each district of West Bengal as per data given in the appendix V. . Six districts namely, Darjiling, Kochbihar, Barddhaman, Birbhum, Bankura and Puruliya are in very high category covering more than 65% of areas in vegetable production. Both Darjiling and Kochbihar contribute winter vegetables whereas other districts supply both summer and winter vegetables. Bankura and Puruliya proved good for vegetables with irrigation as the fertility problem devoid food and cash crops. Haora and Hugli show high production and enjoy the facility of Calcutta, Mega City markets. Rest of the districts produce vegetables along with other crops to feed the home markets. Most strikingly, Malda district show poor production as Mango is grown more carefully trailing others.

Vegetable sproducing areas (in %) of West Bengal is shown in the fig. .1.9. On plant group classification the vegetables are grouped into :-

1. Earth vegetables
2. Herbage vegetables and
3. Fruit vegetables. (Hill E. Albert, 1981).

3.1. EARTH VEGETABLES

Earth vegetables are grouped according to their morphological origin as follows:

3.1.1. Roots

Plants with their edible roots are Beat, Carrot, Reddish, Turnip, Sweet Potato, Yam etc.

3.1.1(a) Beat (Beta Vulgaris)

The garden beat is derived from the wild beat (B. maritima) of the sea coast of the Mediterranean region and its adjacent Europe. Beats are 'Biennials', producing the first year a large cluster of leaves from a crown at the top of the fleshy tap root. The cross section of a beat shows alternative bands of storage and conducting tissues. The zoning of bands varies greatly between varieties, within varieties and according to the environment (Hill, A.F., 1951). Two varieties frown in West Bengal are : Crimson globle and Detroit dark red. Both cooked and uncooked. Beats are edible and used in different purposes.

3.1.1(b) Carrot (Daucus Carota)

Carrot has been cultivated and domisticated from its wild variety for over 3000 years. Europe became familiar with this crop in the Christian era. But, today it is a popular crop all over the world. The numerous varieties of carrots differ in size, shape, colour and quality with the differences in growing conditons i.e. soil and climate. Its enlarged root contains large quantities of Beta carotiva. It is an excellent source of Vitamin A. As a result, the demand for carrot is very high. In deep sandy loam soils of West Bengal, varieties of carrot grown are : Pusa Kesar, Nantees, Coreless etc. Like beats, carrots are also taken cooked and raw.

3.1 1(c) Raddish (Raphanus Sativas)

The crop is both annual and biennial plant with fleshy taproot and rosette of small leaves, which latter replaced by the erect flowering and fruiting part of the plant. Many varieties are in cultivation with size, shape and colour. Raddishes are highly esteemed because of their pungent flavour.

The crop can be taken both raw and cooked. Varieties grown in West Bengal are - 'Pusa', 'Deshi', 'Pusha Reshmi', 'Japanese-white', 'Rapid red', 'Pusa Himani', and 'Pusa Chetaki'.

3.1.1(d) Turnip (Brassica Rapa)

Turnips are native of Mexico but gradually spread all over the cool temperate zones of the world. The turnip has green hairy leaves, an in distinct crown, and a relatively small, fleshly root. They differ in shape, colour and texture. In West Bengal, varieties of Turnips grown are : 'Pusa Kanchan', 'Purple Tap', 'Golden Ball and Snow Ball'.

3.1.1(e) Sweet Potato (Ipomaea Batatos)

Sweet Potato is a native of tropical America from where it has been gradually spread in all tropics of both hemisphere. They are cheap and are available throughout the year. The sweet potato is a twining, training perennial vine with adventitious roots that end of swollen tubers, the edible part. They contain both starch and sugar. This annual crop is propagated vegetatively and can grow in all types of soil but favours sandy soil with warm moist climate. Sweet potatoes are not only a common table vegetable but are used as a source of starch, glucose, syrup and alcohol. (Thompson, H.C. et al, 1967)

3.1.2. Underground Stems

3.1.2(a) Potato (Solanum tuberosum)

Potato is a native of American species and was introduced in Europe by the end of the 17th Century and gradually it spread all over the world. Potatoes are adopted

to a variety of soils and climates but prefer cool moist climate. Potatoes are usually propagated vegetatively by means of tubers or parts of tubers known as 'seed potato'. The essential part of the seed are called 'eyes'. The larger the piece, the more vigorous is the vegetative growth and there is a correspondingly greater yield. The tubers have a rest period of several weeks' duration after they matured, during which they will not sprout. It is estimated that starch and carbohydrate supplied from potato grown in 1 ha of land is equal to that found from paddy grown in 3 ha of land.

Important varieties of potatoes grown in West Bengal are 'Kufri Chandramukhi', 'Kufri Jyoti', and 'Kufri Alankar'. In the plains of West Bengal, potato is basically a winter crop and thrive well when day temperature is 70°C to 75°C. Although potato can be grown in almost all types of soil but rich sandy loam with well irrigation are best for its cultivation. For greater yield, chemical fertilizers are used. Approximately 2 to 3 quintols seed are required for one ha of land. Quick growing varieties are sown from mid October to mid November on both sides of the irrigation canal at a distance of 45 cm to 50cm. Pesticides are sprinkled to avoid fungus attack. The crop is harvested when the trees become dry. (Indo-German Fertilizer Report, 1970)

3.1.2(b) Onion (Allium Cepa)

Onion contains food stored in bulbs. Probably a native of Southern Asia or the Mediterranean region, the onion is long been valued in China and India. They are now cultivated over large areas in temperate and tropical climates but onions prefer cool, moist climate with sandy soil. They are grown from seeds or sets, small bulbers that are produced instead of flowers. Onions have to be derived and cured before they are stored. According to the variety, these bulbs vary in size

(small, medium, large), colour(white, yellow, red), shape (flattened, globular, round), texture fine, course) and pungency. The time of onion planting is from September to December.

3.1.2(c) Garlic (Allium Sativam)

Garlic is a perennial plant with narrow flat leaves and several small egg shaped bulbs known as cloves covered by white skin. The inflorescences produce both seed and bulbets. Both the cloves and the leaves of the garlics have been used for a long period for flavouring good stuff as well as for medicine for their antiseptic and bactericidal values. Varieties grown in West Bengal are 'Deshi' and 'Flowery'.

3.2. HARBAGE VEGETABLES:

Harbage vegetables store their nutrients in parts of the plant develop above ground. The leaves are used in cabbage, spinach and lettuce; stems in asparagus and Kohlrabi; buds in Brussels Sprouts, celary; immature flower in cauliflower.

3.2.1. Asparagus (Asparagus officinalis)

Asparagus is the native of temperate Europe and Western Asia. The plant is perennial. The new shoots are very juicy and succulent. These constitute the asparagus of commerce. The asparagus can be grown in a wide range of soil and climatic conditions. It thrive best in fertile, well-drained soil in moist temperate regions with an abundance sunshine. Once started, asparagus will continue to yield for 15 to 20 years.

3.2.2. Cabbage (Brassica Oteracea)

Although best adapted to the Mediterranean type of climate, cabbage grow from the arctic to the subtropics. Cabbage is one of the best protective foods as it contains antiascorbic vitamin and is also rich in sulphur. The vegetable is a great mass of thick overlapping leaves forming head. The head is the principal food storage organ. It varies in size, shape and colour. Edible quality and adaptability for storage are according to the variety. The crop prefer cool climate and heavy soil. Variety grown in West Bengal are 'Nabi' (late), 'Dania', 'Nabi Benaras', 'Nabi snowball', and the quick variety are 'proud of India', 'golden akar', 'pusa early' and 'Drumhead'. Sowing time is mid October to mid November. Saplings are planted at a distance of 60cm x 45cm. to 60cm x 60cm. apart. Fertilizers usually applied are Sodium (Na), Phosphorus (P), and Potassium (K) at the ratio of 18:24:24 per ha/kg.

3.2.3. Cauliflower (Var.Botrylis.)

Cauliflower is one of the favourite vegetables throughout the temperate regions. A short erect stem is produced with an underdeveloped inflorescence of abortive flowers. Leaves are eliptical and longer which protect the flower from light and wind. Varieties grown in West Bengal are : (1) Quick varieties including 'Kuari', 'early Patna', 'early market', 'early wonder' and 'pusa Katki' (2) mid term varieties include 'patna original', 'Benaras original' and ' quick - snowball'. Saplings are planted in mid July to mid August at the distance of 45cm x 45cm. Fertilizers, like Sodium (Na), Phosphorus (P) and Potassium(K) at the ratio of 48:24:24 per ha/kg give good result.

3.2.4. Spinach (Spinacia Oldracea)

Spinach is the commonest herbage vegetables used for greens. Although a native of South Western Asia, Spinach is widely cultivated in cool regions where abundance of water is available. Spinach produces a large number of basal leaves and latter the flowering part.

3.2.5 Lettuce (Lactuca sativa)

Lettuce is another herbage vegetable with great antiquity. A native of southern Europe and Western Asia was popular to the Greeks as early as 300 B.C. The plant produces a basal rosette of leaves and latter in the season a stalk with flower and fruits. Lettuce thrive best in sandy or loamy soils and prefer cool weather and shade.

3.3. FRUIT VEGETABLES :

Fruit vegetables are technically fruits but they are consumed both as raw and cooked. Some important types are:

3.3.1. Tomato (Lycopersicon esculentum)

Tomato ranks next to potato all over the world. They differ greatly in habit depending upon the environmental relations. Tomatoes are coarse, branching erect or trailing herbs with a berry type fruit. Varieties of tomato grown in West Bengal are : 'Pusa ruby', 'Pusa early dweaf', 'Sultans', 'Early scaalot', 'Punjab tropic', etc. Sapling are transplanted in mid August to mid November at a distance of 75 cm x 60cm. apart. Fertilizers applied usually are Na,P.K. at the ratio of 32:16:16 per ha per kg. Tomatoes are eaten

raw or by cooking. These can also be preserved as pulp, sauce, juice, ketchup etc.

3.3.2. Egg Plant (Solanum Melongeua)

Egg plant (popularly known as Brinjal) is of Indian origin but is widely grown in the warmer regions of both the hemispheres. The plant is an erect branching herb, several cm in height. The flowers occur singly or in clusters opposite the leaves. They are moderately large, perfect, violet or purple in colour and mostly self-pollinated. The fruit is fleshy, large, avoid varying in size (5 to 15 cm in diameter), shape(long, avoid or pyriform) and colour (Purple, light purple, yellowish, striped or white) according to the variety. The plant is cultivated as an annual land requires fairly high temperature (21°C to 24°C) for prompt germination. In West Bengal, varieties grown are - 'pusa purple (round and long), 'Muktakeshi', 'Pusa kranti', 'Black beauty', 'Pusa pruple'. Saplings are planted in mid September to mid November at a distance of 75 cm x 60 cm apart. Fertilizers applied are as usual NPK at the ratio of 48:24:24 per kg per ha.

3.3.3. Okra (Hibiscus escutentus)

Okra, popularly known as 'Lady's - finger' is an annual plant. From the original homeland of tropical Africa it has now been introduced into most warm tropics and subtropics. The plant is stout and annual leaves are ovate and lobed. Flowers are oxilary, large, showy and contain both stormen and pistils. The fruits are elongated with relatively large pods. Variety grown in West Bengal is 'pusa sawani'. Okra (lady's finger) is consumed in immature stage.

Some vegetables are known as vine crops. These crops belong to the cucumber family and they have similar agro-climatic conditions and cultural requirements and are attacked by the same insects and diseases. They are cucumber, pumpkins, squash and watermelons.

3.3.4 Cucumber (Cucumis Sativas)

Cucumber is probably indegenous to southern India. The plant is rough stemmed trailing vine with yellow axillary flowers and round to elongated prickly fruit. Water content is very high (96%). Fruits vary in size (long , moderately long and shsort), colour of the rind (light to dark green), and colour of the spines (white or black). Cucumbers are eaten raw, pickled or cooked. (Plate-12)

3.3.5. Pumpkin and Squash (Cucurbita)

Pumpkins and squashes are gourd fruits belonging to the genus cucurbita. The plants are coarse annual vine with large yellow flowers and fruits rest on the ground. Immature fruits are used as fresh vegetables. Seeds are rich in fats. Fruits are fleshy and varying greatly in shape, size and colour.

3.3.6 Capsicum Peppers (Var. Grossum, Longum)

Three types of Capsicum peppers are grown in West Bengal : (1) Sweet (2) Pimiento and (3) Sweet peppers are relatively large and are eaten fresh or cooked. Pimiento peppers are heart shaped and are used in seasoning. Hot peppers are small and are used in cooking as spice. The stem is erect, woody at the base and much branched. The flowers, fruits and seed occur singly in the axis of the leaves. The fruit is fleshly, overy, dark green when immature and red and yellow when mature according to the variety. Both green and

mature fruits are high in carotene, B Vitamins and as ascrobic acid. Capsicum is eaten as raw in salads or cooked in various ways. Piemento pepper also known as paprikas are dried and are used as powder for flavouring. The culinary uses of hot pepper of chillis are numerous.

Varieties grown in West Bengal are 'N - P 46A' and 'Suryamukhi'. Saplings are planted in mid October to Mid November at the distance of 45x x 45 cm. Fertilizers applied are NPK at ratio of 32:16:16 per ha per kg.

3.3.7 Water melon (citrullus vulgaris)

The watermelon, a native of tropical Africa has been cultivated for centuries in India and Egypt. Evidences have been found in Sanskrit name and Egyptian paintings. The watermelon is an annual plant with extensive vines which may cover the whole field. Flowers occur singly in axils of the leaves and usually open at sunrise and close on the afternoon of same day. The steams are angular in cross-section and Leaves are divided into three or four lobes. According to the variety, the fruits are great in size (from 2 to 18 kg.), shape (round, oval, oblong or cylindrical), colour (ligh grey, blackish green, stripped). The reddish-pink pulp is sweet and juicy with white of black seeds. The plant requires a fertile sandy soil with abundant sun shine.

In West Bengal, two varieties of water melon are grown, namely - 'Sugarbaby' and 'Ashahi yamato'. The variety is widely cultivated in the Sagar Island which supplies in the market during the months of May, June and July.

Legumes are next in importance to cereals as a source of human food as they contain high protin and rich in minerals and vitamin B. the seeds are of greatest importance as low water content and improveris seed coat enhances their value for storage. In this category, some legumes are known as vegetable legumes while other are called pulses.

3.3.8 The Garden Pea (Pisum Sativum)

Garden peas differ from other beans as their stems are holow and their leaves are compound with one, two or three pairs of leaflets, a branched terminal tenderish and large stipule. Flowers are borne singly or in pairs on long stalks, white in colour and pods are non-constricted with round and smooth green coloured seeds.

Varieties grown in West Bengal are 'Early market', 'Early December', 'Meteor', 'Arkel', 'N. P 20 and 'Bonnyvely'. An uniformly cool climate is needed and hence the crop is sown in mid October to mid November at the distance of 30cm x 15 cm apart. Fertilizers applied are N.P.K. at the ratio of 20:20:20 per kg per ha.

3.3.9. Snap Bean (Phaseolus Vulgaris)

Snap Bean is also known as Garden Bean. the crop is domisticated by the Jucas of America but today are grown all over the world. Varieties are grown according to the AGro-climatic conditions. Beans are low, erect or twining annuals with small white coloured flowers. tri-foliate leaves and slender pods. Cultural practice is common to the group.

3.3.10. Lima Bean (Phaseolus Limeneris)

Lima Beans (Shim) is a native of Latin America. Two varieties are groun; (1) Pole types and (2) Dwarf types. Each type has (i) small seeded and (ii) large seeded. The plant

is usually treated as annual. Small seeded type has erect stem, hairy leaves and small numerous pods whereas plants of the long seeded types have large thick leaves and relatively few pods. Lima beans are grown for local markets.

Table 3.2 clearly shows the area and production of vegetables in West Bengal during the year 1994-95.

Table-3.2

The area and production of seasonal vegetables in West Bengal during the year 1994-95.

Vegetables produced	Area in ha.	Production in '000 m tons.	Field in'000 m ton/ha.
A. 1. Summer	107.5	860	0.04
2. Kharif	60.4	604	10.07
3. Winter	241.0	2651	11.00
B. Chilli	48.6	37	0.77
C. Potato	206.2	4532	21.98

Source: Department of Agriculture, Govt. of West Bengal.

Chilli and Potato are classed differently as it is an all weather crop.

An attempt has been made to show a detail picture of area under some important vegetables produced in West Bengal during the year 1994-95.

Table-3.3

Area under common vegetables grown in West Bengal during the year 1994-95.

Sl. No.	Name of the vegetables	Area in thousand hectre			
		Summer	Kharif or Rainy season.	Winter	Total
1.	Brinjal	33.3	23.4	31.7	88.4
2.	Lady's finger	25.0	14.9	7.2	47.1
3.	Cabbage	0.4	0.6	34.9	35.9
4.	Cauliflower	0.9	0.8	31.7	33.4
5.	Tomato	0.03	1.4	16.67	18.1
6.	raddish	3.5	3.8	16.7	24.0
7.	Onion	5.3	0.1	17.3	22.7
8.	Cucumber	11.9	4.7	4.5	21.1
9.	Water melon	9.0	0.4	3.1	12.5
10.	Pumpkin	21.5	7.9	8.0	37.4
11.	Other Gourds	17.0	6.9	7.3	31.2
12.	Sweet Potato	9.3	1.9	8.5	19.7
13.	Carrot	0.1	0.01	1.0	1.4
14.	Pea	0.9	0.1	2.3	3.3
	Total:	137.2	66.8	190.8	396.2

Table 3.3 shows area under common vegetables grown in West Bengal throughout the year. Summar vegetables like Brinjal, Lady's finger, pumpkin occupy larger areas winter vegetables. From the table, it is found that vegetable grow

sufficiently in winter in the State covering 1908 ha while in summer the area declines to 137.2 as heat and drough affect some areas. The lowest area being 66.8 ha due to water logging conditions in lower Bengal which produce maximum vegetables in the State.

CONCLUSION :

Although technically all plants are vegetables, but the term usually applied to edible plants which store food in their roots, stems, leaves, flower or fruits which are eaten cooked or raw. This chapter critically analysed these items. It is revealed from the districtwise area under vegetables excluding potato (which is treated more as a cash crop them vegetable) that some in northern and western part of West Bengal produced largely. Vegetables are classified according to their morphological origin as (1) Earth vegetables, which are grouped into (a) Roots (b) underground stems (2) Herbage vegetables and (3) Fruit vegetables. Each type has been discussed with their origin, speciality and subtypes. Growing condition of each variety and their excellence with West Bengal's variety is analysed and it is found that the production of vegetables in West Bengal during the year 1994-95 significantly. Very little differences are there yearwise. A detailed picture of some important vegetables of West Bengal is shown in Table No.3.3. More about vegetables are discussed in the economy Chapter (v). Floriculture, the most beautiful part of horticulture has started from more hobby. A survey on floriculture is discussed in the following Chapter (IV).