



**FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES**

## Botanical classification

### I. Botanical classification:

Class: Spermatophyta

Division-I: Gymnospermae: Ovules naked, not enclosed in ovary

Division- II: Angiospermae: Ovules in an ovary

- All vegetables belong to the group Spermatophyta and sub division II Angiospermae. Botanical classification is most useful from breeder's point of view and helps in identification of vegetables. It provides information on morphological and cytological similarities and dissimilarities, floral biology and other details of crop improvement. The botanical names along with the family of common vegetable crops are given below.

<b><u>Monocotyledonae (one seed half):</u></b> <b>1)Amaryllidaceae (Alliaceae)</b> Onion Garlic Leek	<i>Allium cepa</i> <i>A. sativum</i> <i>A. porrum</i>
<b>2) Araceae</b> Colocasia	<i>Colocasia esculenta</i>
<b>3) Graminae</b> Sweet corn	<i>Zea mays</i>
<b>4) Liliaceae</b> Asparagus	<i>Asparagus officinalis</i>

<b>5) Dioscoreaceae</b> Yam	<i>Dioscorea alata</i>
<b><u>Dicotyledonae (Two seed half):</u></b> <b>1) Aizoaceae</b> New Zealand spinach	<i>Tetragonia expansa</i>
<b>2) Araliaceae</b> Udo	<i>Aralia cordata</i>
<b>3) Chenopodiaceae</b> Beet Spinach Palak	<i>Beta vulgaris</i> <i>Spinacia oleracea</i> <i>Beta vulgaris</i> var.bengalensis
<b>4) Convolvulaceae</b> Sweet potato	<i>Ipomoea batatas</i>
<b>5) Cruciferae ( Brassicaceae)</b> Cabbage Cauliflower Brussels sprout Chinese cabbage Turnip Mustard Raddish	<i>Brassica oleraceae</i> var. <i>capitata</i> <i>Brassica oleraceae</i> var. <i>botrytis</i> <i>Brassica oleraceae</i> var. <i>Gemmifera</i> <i>B. Campestris</i> var. <i>pekinensis</i> <i>B.campestris</i> var. <i>rapa</i> <i>B. juncea</i> <i>Raphanus sativus</i>
<b>6) Cucurbitaceae</b> Pumpkin Summer squash Cucumber Ridge gourd Sponge gourd Snake gourd Bottle gourd Water melon Winter squash Bitter gourd	<i>Cucurbita moschata</i> <i>Cucurbita pepo</i> <i>Cucumis sativus</i> <i>Luffa acutangula</i> <i>Luffa cylindrica</i> <i>Trichosanthes cucumerina</i> <i>Lagenaria siceraria</i> <i>Citrullus lanatus</i> <i>Cucurbita maxima</i> <i>Momordica charantia</i>
<b>7) Compositae (Asteraceae)</b> Lettuce Globe artichoke Jerusalem artichoke	<i>Lactuca sativa</i> <i>Cynara scolymus</i> <i>Helianthus tuberosus</i>
<b>8) Euphorbiaceae</b>	

Tapioca/cassava	<i>Manihot esculenta</i>
<b>9) Leguminosae (Fabaceae)</b> Cluster bean Indian bean/Hyacinth bean Lima bean Kidney/snap/French bean Cow pea Winged bean/Goa bean Sword bean Methi/fenugreek	<i>Cyamopsis tetragonoloba</i> <i>Dolichos lablab</i> <i>Phaseolus lunatus</i> <i>P. vulgaris</i> <i>Vigna sinensis</i> <i>Psophocarpus tetragonolobus</i> <i>Canavalia gladiata</i> <i>Trigonella foenum graecum</i>
<b>10) Malvaceae</b> Bhendi	<i>Abelmoschus esculentus</i>
<b>11) Solanaceae</b> Potato Tomato Sweet pepper Brinjal Hot pepper	<i>Solanum tuberosum</i> <i>Solanum lycopersicum</i> <i>Capsicum annuum var grossum</i> <i>Solanum melongena</i> <i>Capsicum annuum var annuum</i>
<b>12) Umbelliferae</b> Carrot Coriander Celery	<i>Daucus carota</i> <i>Coriandrum sativum</i> <i>Apium graveolens</i>

## II. Parts used:

*Stem:* Asparagus, Potato, Kholrabi

*Leaves:* Methi, Palak, Coriander, Amaranthus, Spinach, Cabbage

*Fruits:* Tomato, Brinjal, Okra, Peas, Beans, Watermelon, Pumpkin, Chillies

*Flower:* Cauliflower, Broccoli, Globe artichoke

### 5) Underground portions:

1) Roots: Beetroot, Radish, Carrot

2) Tuber: Potato

- 3) Bulb: Onion, Garlic
- 4) Corm: Yam
- 5) Rhizome: Turmeric, Ginger
- 6) Immature seed: Peas, Beans

## Method of culture

### III. Method of culture :

- By this method it is possible to generalize the cultivation practices based on their culture and climatic requirements.

Sl. No.	Group	Vegetables
1	Perennial vegetables	Asparagus, Artichoke, Chow chow, Moringa, Ivy guard, Pointed gourd, Spine gourd
2	Greens	Spinach, New Zealand spinach, Kale, Chard, Mustard, Collards, Amaranthus
3	Salad crops	Celery, Lettuce, Cress, Parsley
4	Cole crops	Cabbage, Cauliflower, Broccoli, Brussel's sprout Chinese cabbage, Knol-khol
5	Root crops	Beet root, Carrot, Parsnip, Turnip, Raddish
6	Bulb crops	Onion, Leek, Garlic, Shallot, Welsh Onion, Chive
7	Tuber crops	Potato, Sweet potato, Cassava, Elephant foot yam

8	Peas and beans	Pea, Bean, Broad bean, Lima bean, Winged bean, Cowpea
9	Solanaceous crops	Tomato, Brinjal, Chilli, Pepper
10	Cucurbits	Cucumber, Watermelon, Pumpkin, Gourds
11	Fibre crop	Okra
12	Pot herbs green	Spinach, Kale
13	Other root crops	Colocasia, Dioscorea, Arrow root

#### IV. Life cycle:

**Annuals:** Vegetables which complete their life cycle in one season.

Eg: Broad bean, Lima bean, Water melon, Musk melon, Indian spinach, Chinese cabbage, Cress etc.

**Biennial:** Those végétales which complète their life cycle in two seasons.

Eg. Cabbage, cauliflower, turnip, carrot, etc.,

**Perennial:** Those végétales which complète their life cycle in more than two seasons.

Eg. Artichoke, chicory, asparagus, chow chow, coccinia etc.,

### Thermo classification

#### V. Thermo classification:

- On the basis of temperature, vegetable crops may be grouped into cool and warm season crops. In cool season crops, the edible parts are mainly root, stem, leaf and immature flower parts. Whereas, in warm season crops edible part is mainly fruit with exception of pea and broad bean which are cool season crops. The cool season crops grow well when the monthly mean temperature does not exceed 21°C. They thrive best if the monthly mean temperature is 15-17°C. The warm season crops on the other hand grow best when the monthly mean and average maximum temperature are 5 to 6°C higher than for the cool season crops. The average monthly minimum temperature should not be below 9°C to 10°C for the warm season crops.

<b><i>Cool season vegetable crops</i></b>	<b><i>Warm season vegetable crops</i></b>
Cole crops	Beans(mostly)
Root crops	Solanaceous vegetables
Bulb crops	Gourds
Lettuce	Okra
Methi	Cassava
Pea	Summer squash
Potato	Sweet potato
Winter squash	Yam

## VI. Photoperiod:

**Short day vegetables:** Soybean, Sweet potato

**Long day vegetables:** Flowering is induced by period longer than critical units.

eg; Spinach, beet, Chinese cabbage, Lettuce, Radish etc.

**Day neutral vegetables:** Flowerings induced by a period of 10-18 hours of even continuous illumination.

eg: Tomato, Squash, Pumpkin, Asparagus, Pepper etc.

## Growing season

## VII. Growing season:

**Kharif:** Cucurbitaceous vegetables which complete their life cycle during rainy season.

**Rabi:** Root crops, Cole crops, Potato, Lettuce etc., which grow from October to February

**Summer:** Melons etc., which grow from February to May.

## VIII. Methods of raising:

**Direct sown crops:** Okra, Carrot, Radish, Beans, Peas, Garlic.

**Transplanted crops:** Tomato, Brinjal, Chillies, Cabbage, Cauliflower.

**Vines and cuttings:** Sweet potato, Cassava, Pointed gourd, Coccinia.



**Bits of tubers and corms:** Potato, Yams.

## IX. Hardiness:

- Vegetables which can tolerate frost are known as hardy and vice versa are known as tender. The degree of frost tolerance makes the crop hardy, semi hardy and tender.

<b>Hardy vegetable crops</b>	<b>Semi hardy vegetable crops</b>	<b>Tender vegetable crops</b>
Asparagus	Beet root	Amaranthus
Broccoli	Carrot	Okra
Brussels sprout	Cauliflower	Chilli
Cabbage	Celery	Tomato
Garlic	Globe artichoke	Cluster bean
Knol khol	Lettuce	Cowpea
Leek	Palak	Cucurbits
Onion	Potato	Snap bean
Peas		Sweet potato
Radish		Tapioca
Spinach		Yams

## X. Rate of respiration:

- After harvest, the rate of respiration of the parts harvested enhanced depending on the climatic conditions. The vegetable having the lowest rate of respiration possess the longest storage ability.

### Respiration rate of vegetables

Very high	High	Moderate	Low	Very low
Asparagus	Bean	Beet	Cabbage	Onion
Broccoli	Lettuce	Carrot	Sweet potato	Potato
Pea	Lima bean	Celery	Turnip	Pumpkin
Spinach		Cucumber		Ashgourd

## XI. Forcing:

**Cool forcing vegetables:** Asparagus, Beetroot, Cauliflower, Celery, Lettuce, Onion, Pea, Raddish, Spinach

**Warm forcing vegetables:** Bean, Cucumber, Brinjal, Muskmelon, Pepper, Tomato

## XII. Soil reaction (pH):

Slightly tolerant	Moderately tolerant	Highly tolerant
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<b>(6-6.8 pH)</b>	<b>(5.5 to 6.0pH)</b>	<b>(5.0-5.5 pH)</b>
Asparagus	Carrot	Potato
Onion, Cauliflower	Cucumber	Sweet potato
Broccoli, Leek	Brinjal, Garlic	Water melon
Cabbage,	Pea, Chilli, Radish	Chicory
Lettuce, Muskmelon	Pumpkin, Tomato	Rhubarb
Celery	Turnip, Parsely	

### **XIII. Rooting depth:**

<b>Shallow rooted (30-40 cm)</b>	<b>Moderately deep rooted (50-60 cm)</b>	<b>Deep rooted (80-100 cm and above)</b>
Broccoli	Beet	Artichoke
Brussels sprout	Carrot	Asparagus
Cabbage	Cucumber	Cluster bean
Cauliflower	Brinjal	Cow pea
Garlic, Leek, Lettuce	Muskmelon	French bean
Onion, Potato, Radish	Pea, Pepper	Lima bean

Spinach	Summer squash, Turnip	Pumpkin, Sweet potato, Tomato, Water melon
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