3.4 VEGETABLES

It is estimated that 20% of daily food of an adult should necessarily comprise of vegetables in order to maintain normal health. In order to improve the diet of the people, it is essential to encourage vegetable production.

It is natural that vegetable growing farmers make good living out of small holdings, and generally they yield higher income in lesser time when compared to other food crops. Vegetables can be produced in succession on the same piece of land, because they are invariably short duration crops and all the family members of vegetable grower can be usefully employed throughout the year.

a. **Brinjal (Egg Plant – *Solanum melongena*)**

Brinjal or egg plant is a warm season fruit vegetable. This vegetable is consumed when they are still unripe. Brinjal has high nutritive value, rich in Vitamins A and B. They are used as cooked or fried vegetable. This vegetable is among the recommended ones for diabetic patients.
1. Cow dung and poultry manure mixed in 1:1 ratio if applied to brinjal garden during land preparation, gives more yields.

2. Growing castor in brinjal fields as border crop acts as a trap crop for insects.

3. Growing onion / garlic as intercrop in brinjal helps to control many pests including fruit borers

4. Cultivation of Subsige (*Anethum sowa*) in Brinjal controls fruit borer in Brinjal. Subsige (*Anethum sowa*) odour repels fruit borer

5. Grinding 40 kg of Neem seeds and applying to one acre on 50 days old plants, helps in obtaining higher yield.

6. Neem cake 4 kgs (Powdered), and *Aloe vera* 4 Kgs (chopped and crushed finely) are soaked in 100 liters of water and the above mixture is stored in a container closed with lid. After 10 days, the contents are filtered and sprayed to control thrips in one acre of brinjal.

7. Ash and turmeric powder are mixed in 1:1 ratio and sprinkled to control aphids in the morning hours, when the due moisture is there on the leaves.

8. Sprinkling of lime powder helps to control mealy bugs.

9. Cow urine, neem oil and tobacco decoction are mixed in 1:1:1 ratio in one litre of water and sprayed to control all sucking pests.

10. Placing one spoon of neem cake at the root zone helps to control shoot borer and stem rot.
11. Spray neem cake extract to control mites and the spotted beetle (*Epilachana octopunctata*) in brinjal

12. Brinjal fruits are harvested for market before their stalks change from green to brown in colour

13. For seed extraction in brinjal, medium sized fully ripened fruits which are bright yellow in colour are harvested. Then they are cut into 4-6 pieces and softened by soaking in water overnight. Next day, the seeds are removed and washed well with water. After washing add little quantity of wood ash. Dry it in the shade and preserve in a cloth / mud pot.

14. Well matured and ripen brinjal fruits are cut with some portion of the stem. And cut the brinjal into 4 parts and tie it with the thread and hang it (8 to 10 feet) above the chullah (chimney). Smoke from the chullah will help the seeds to dry naturally. Extracted seeds are mixed with wood ash and shade dried for 2-3 days and stored upto six months.

15. Take ½ kg cakes of each are soaked overnight in enough water to submerge them. (This quantity is sufficient for an area of 50 sq. meters). The soaked cake should be broadcasted and mixed well with the soil in early morning. It gives good yield and reduces the population of all major brinjal pests like root aphids, fruit and shoot borer, *Epolaehna* beetle and other major pests.

16. 1 Kg of fresh custard apple leaves and 1 kg of neem cake soaked in 2.5 litre of cow’s urine overnight, then filtered. The filtered solution is diluted with water in a ratio of 1:3 and
sprayed on foliage. It gives the effect in controlling the pests of Brown hairy caterpillar.

17. Take 1 kg of fresh custard apple leaves and ½ kg of Neem cake are soaked in 3 lts of cow’s urine overnight. The filtrate is diluted with 8 lts of water and sprayed. It effects against Epilachna beetle, and controls Grub and adult.

b. Tomato (Lycopersicon esculentum)

Tomato is a solanaceous fruit vegetable and necessarily a warm season crop. Fully ripen red and green fruits are consumed as vegetables. Tomato fruits are rich sources of Vitamins A, B and C. Tomato is consumed both cooked and raw (preferred in Salads), and are used to prepare preserves, pickles, etc.

1. Application of tank silt @ 25 t/ ha to irrigated tomato saves cost on plant protection and supplies micronutrients that build resistance to pests
2. Five ml of neem oil, in one litre of water, with one drop of soap liquid (which acts as emulsifier) are mixed thoroughly and sprayed on the plants to control pests attack and also control flower droppings in tomato.

3. Dissolve 500 gm wood ash and 500 gm cow dung in 10 litre of water and spray it to reduce flower dropping in tomato.

4. Grow marigold as border crop in tomato fields to prevent fruit borer and leaf miner attack.

5. Agriculture and weed waste materials are burnt near the fields along the wind direction, immediately after Sunset, to control many pests, an old practice by the famers.

6. To control most of the pests in tomato, 1½ kg. of pungam \( (Pongamia pinnata) \) leaves, 1½ kg of Nochi \( (Vitex negundo) \) leaves and one kg of neem leaves are cooked in a container for two hours from which decoction is prepared and dissolved in 20 litres of water and sprayed during evening hours for three or four times at monthly intervals.

7. One kg of Asafoetida tied in a cloth is kept in irrigation channel to control fruit borer. It will be sufficient for one acre.

8. Two kg of neem kernels are powdered and soaked in five litres of water for 10 days after which it is filtered, mixed with 50 litres of water and sprayed for one acre of tomato crop to control fruit borer, leaf miner and thrips.

9. 250 gms of dried tobacco leaves are boiled in 4 litres of water for 30 minits, allowed to cool, and filtered. The filtrate is diluted with an equal part of water and 30 gms of bar soap is
added and sprayed. It effects on diamond backmoth and all diamond back die with in one day. It effects against aphids also.

10. Dust wood ash on the crop in the morning hours to control *aphids, thrips* etc

c. **Chilli (Capsicum annuum)**

Chilli also is a solaneous fruit vegetable consumed in both unripe and ripe forms. Chilli fruits are very rich in Vitamins A and B, while green chillies are rich source of Vitamin C. The pungent types of chillies are used in the preparation of condiments and the types with larger fruits with less pungency are consumed raw with salads and are also cooked and used.

1. Application of 250 kg of Neem cake per acre results in higher yield.

2. Growing castor as a border crop acts as a trap for tobacco cut worms.
3. Pruning vegetative branches in chilli enhances plant life and yield and induces fruiting branches.

4. Application of 100 kg of Groundnut cake per acre reduces the flower dropping.

5. *Asafoetida* @ 1kg/ac powdered, tied in a cloth and placed in the irrigation channel will act as a pest repellant.

6. Grow coriander as intercrop or border crop to act as a repellent in controlling all sucking pests.

7. Spray the leaf extract of *Prosopis juliflora* (5kg in 50 litres of water), two months after planting to control leaf spot, powdery mildew and fruit rot in chilies.

8. Four Kg of Neem seeds powdered, placed in muslin cloth and tied are soaked in 10 litres of water for 24 hours; the content is filtered and 50 gm of soap powder is added to the filtered extract and diluted with 90 litres of water; and sprayed in the evening times to control many pests of chillies.

9. Leaf extract of “Bilwapatra” (*Aegle marmelos*) is sprayed to control fruit rot in chillies.

10. Red earth treatment to Chili – Retention of red color – Acts as insulator against temperature and sunlight
d. **Lady’s Finger** (*Abelmoschus esculentus*)

Lady’s finger commonly called as Bhendi is a fruit vegetable belonging to Malvaceae family. Unripe fruits are used as vegetables. The fruits are rich source of Vitamins A, B and C in addition to possessing iodine and calcium. Unripe fruits are used cooked or fried as a vegetable.

1. Application of five tons of Sheep / poultry / farm yard manure per acre gives more yields

2. To control yellowing of fruits, four kg of fresh leaves of *Prosopis juliflora* are grinded well; add two litres of water, boil it for 20-30 minutes; allow to cool for 24 hours which is filtered and diluted with 10 litres of water. Add one litre of cow urine and spray on the crop.
e. **Small Onion** (*Allium cepa var. aggregatum*)

Onions are used for seasoning and flavouring vegetable and meat dishes. They are used for making salads, pickles and extracts in culinary preparations. Onion is an important ingredient in preparing chutneys and is of great medicinal value. Onions are rich in Vitamins B and C.

1. To get bigger sized bulbs in onion, 15 kg of groundnut cake is powdered, placed in muslin cloth, tied and kept in the irrigation water channel.

2. Bunching local small onions and hanging to the roof enhances shelf-life. Hanging prevents rodent damage and the higher temperature and air circulation near the roof have a curing effect.
3. Apply two cart loads (300 kg) of wood ash at 25 days after planting to control onion blight.

4. Cow dung is dissolved in irrigation water channels to control onion blight.

5. Broadcasting of 15 kg rock salt per acre of onion crop will improve the colour of the onion bulbs. This has to be done when the crop is 30 days old.

6. Rolling an empty drum of about 10 kg weight in onion field 10-15 days before harvest facilitates removal of stalk and physical breaking of photosynthesis from the bulb.

f. Garden Bean (*Lablab purpureus var. typicus*)

It is a leguminous vegetable having good effect on soil fertility due to its deep penetrating roots and ability to fix atmospheric nitrogen. Green pods with mature seeds rich in protein are consumed as vegetables. They form an excellent source of vitamins and minerals. Green pods when consumed inclusive of their outer cover are good to combat constipation and indigestion.
1. After the Lablab vines fully spread on the bower (pendal), tips are clipped off to facilitate more branching and flowering.

2. Dust wood ash early in the morning (before sunrise) to control sucking pests like aphids and thrips.

3. Dissolve 200 gm of detergent soap in 100 litres of water and mix it thoroughly. Spray the above extract to control mealy bugs.

4. One kg leaves of Prosopis juliflora is pounded and soaked with one litre of water. After 7 days, filter and dilute with 10 litres of water and spray to control yellow mosaic virus.

5. Lablab seeds are mixed with either wood ash or ant hill soil with little moisture to hold the mud to cover the skin of the seeds, and stored upto one year.

g. **Drum Stick (annual) – (Moringa oleifera)**

In addition to drumstick fruits, the leaves and flowers are also consumed as vegetables. It is highly rich in Vitamin C and carotene. It has considerable quantity of iron, phosphorus and calcium. These days it is invariably used as a component in Sambar preparations on big occasions like marriages as it has a
special preference of taste among the consumers in a big way.
1. Seeds of the drumstick are soaked in the milk and fresh cow dung slurry overnight before planting. This will help to improve the taste and controls soil borne diseases.
2. One week old fully fermented buttermilk is poured near the trunk and watered. The taste of the leaves and fruits will improve, it is believed.
3. Place a pinch of Asofoetida just deep into the soil near the roots of drumstick trees to control hairy caterpillars
4. Crop wastes and other residues are burnt around the base of the drum stick tree to control hairy caterpillars.

h. Cucurbits
The crops falling under this category are cucumbers, melons, pumpkins, squashes and gourds. They are mostly trailers with the exception of squashes. They come up well in hot weather conditions. Unripe and tender fruits of most of these crops are cooked as vegetables. However, musk melon and water melon are consumed...
in the form of ripe fruits. Pointed gourd and Coccinia (*Thonde*) are perennial in nature while the rest of them are all annuals. Many of the cucurbitaceous vegetables having more self life and can be stored. They are rich in vitamins and minerals and possess medicinal properties.

1. Soaking the seeds of snake gourd in cow dung solution for ½ hour before sowing helps for early germination and withstanding drought conditions
2. Cucumber and beans seeds dipped in kerosene before sowing, keeps ants away from the field. This acts as an ant repellent
3. Ash is sprinkled on cucumber crop (before sunrise) to control aphids and powdery mildew.
4. *Asafoetida* (25 gm) is dissolved in one litre of water. Spraying the contents helps to control flower dropping.
5. To avoid coiling and to get straight and elongated fruits in snake gourd, small stones are tied at their bottom with the threads when they are ½ foot long.
6. Bitter gourd seeds are pressed on to the cow dung flakes put on mud walls, allowed to dry under the Sun and stored in cool places after drying.
7. Fully matured and dried ridge gourd and bottle gourd fruits are collected and hanged in the house for seed preservation.
8. Cucumber and Pumpkin seeds are extracted from fully ripened fruits, washed well with water, mixed with wood ash, dried and stored up to one year.
i. **Potato** (*Solanum tuberosum*)

It is a very important commercial vegetable crop. The edible portions of this crop are the tubers that are modified stems and they are rich in starch and can be stored for few months without spoilage.

1. Before planting potato, seeds are dipped in cow dung slurry for 30 minutes which helps in controlling tuber rot.
2. Crop rotation of potato with other crops like Marigold and onion, is practiced to control golden nematode.
3. Neem cake powder (150 kg) is broadcasted per acre at planting to control tuber rot.
4. Lime (100 kg) is applied to potato fields at planting to reduce acidity in order to control brown rot.
5. Four kg of Neem seeds are powdered and dissolved in 100 litres of water and filtered. Add 10 litres of cow urine and mix it with 50 gm of detergent powder. Spraying this extract will control many pests and diseases of potato.
6. Forming a trench around the heap freshly harvested potato and filling with water – Enhances shelf – life – Better submerization due to cold storage

**j. Cole Crops**

Cabbage, cauliflower and knolkhol fall under this group of vegetables and they are essentially winter season crops. Enlarged terminal buds of cabbage, flowering head of cauliflower and enlarged stem of knolkhol form the essential component of vegetables. They are rich in Vitamins A and C.

1. Grow garlic as an intercrop in cabbage to control diamond back moth attack
2. Grow mustard as an intercrop in cabbage crop at two rows of mustard for every 25 rows of cabbage to control diamond back moth, leaf roller, *Heliothis* worm etc. (also for cauliflower).
3. Cauliflower cultivation is avoided during summer months to reduce diamond back moth incidence.
4. Cauliflower is cultivated on terraces in sloppy lands to avoid soil erosion.

5. Neem oil 100 ml dissolved in 10 litres of water, is mixed with five gm of liquid soap or five gm of detergent powder. Spraying this solution will effectively control diamond back moth in cauliflower.

**k. Green Leafy Vegetables**

Green leafy vegetables have proved over time that they provide more protective energy to human body than any other vegetable. Not only they are rich in Vitamins A, B and C but also are the treasure houses of minerals like iron and calcium.

There are nearly 20 leafy vegetables grown in this country all round the year. They are very easy to grow and mostly propagated from the seeds through direct seeding.
Following are some of the green leafy vegetables grown in the country:

<table>
<thead>
<tr>
<th>Common Names</th>
<th>Popular Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenugreek</td>
<td>Methi</td>
<td>Trigonella fiebynggraccum</td>
</tr>
<tr>
<td>Spinach</td>
<td>Palak</td>
<td>Spinacea oleracea</td>
</tr>
<tr>
<td>Love-lies-bleeding</td>
<td>Rajgir</td>
<td>Amaranthus candatum</td>
</tr>
<tr>
<td>Indian spinach</td>
<td>Bayi Basale</td>
<td>Basella rubra</td>
</tr>
<tr>
<td>Anethum</td>
<td>Sabsige</td>
<td>Anethum sowa</td>
</tr>
<tr>
<td>Deccan Hemp</td>
<td>Pundi</td>
<td>Hibiscus cannabinus</td>
</tr>
<tr>
<td>Indian Sorrel</td>
<td>Hulichikki soppu</td>
<td>Oxalis corniculata</td>
</tr>
<tr>
<td>Coriander</td>
<td>Kotthumbri</td>
<td>Coriander sativum</td>
</tr>
<tr>
<td>Dantu (Amaranthus)</td>
<td>Kempu Dantu</td>
<td>Amaranthus blitum</td>
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<tr>
<td></td>
<td></td>
<td>Var. oleracea</td>
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<tr>
<td>Prince’s feather</td>
<td>Chikkire</td>
<td>Amaranthus polygamous</td>
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<tr>
<td>Keere (Amaranthus)</td>
<td>Chikka Harive</td>
<td>Amaranthus tricolor</td>
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<tr>
<td>Harive (Amaranthus)</td>
<td>Harive</td>
<td>Amaranthus vividis</td>
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<tr>
<td>Mentha</td>
<td>Pudina</td>
<td>Mentha arvensis</td>
</tr>
<tr>
<td>Kirakasale (Amaranthus)</td>
<td>Chilakarive</td>
<td>Amaranthus blitum</td>
</tr>
</tbody>
</table>

These are generally cultivated with ease using only farm yard manure. They are seldom attacked by pests and diseases, and that is how they are the most popular vegetables eaten by every common man and their contribution towards common man’s diet in India is immeasurable indeed.
General Pest Control Methods and Tips for Vegetables

1. Maize is grown around vegetable gardens which will act as a physical barrier for insects. Insects act as vectors in spread of diseases.

2. Growing *Tecoma* species and *Nerium odoratum* (Indian oleander) as border crops, will act as traps and control the insect pests of the main crop.

3. Planting of garlic, onion, mint, marigold and other aromatic plants in between the rows of vegetable gardens will act as a natural pest repellent.

4. Woodash is dusted on the crops early in the morning (before Sunrise) to reduce pest attack in vegetable gardens.

5. Spreading of dried neem leaves powder over the vegetable seedling nursery, helps to control termite damage.

6. Spray a solution made out of 1 kg crushed garlic which is soaked in 200ml of kerosene, mixed with 2 kg green chilli
paste & dissolved in 200 liters of water. This will help in controlling hairy caterpillar and *Heliothis* pest. It also acts as contact insecticide and a repellent.

7. Sprinkling with neem leaves, cow urine mixed with water (1:10 ratio) helps to control many pests and diseases.

8. Four kg of Neem seed kernel extract in 100 litres of water is mixed with 50 gm of detergent powder. Spraying the extract will destroy the eggs (*ovicidal properties*) of the insects and also it controls many pests in different vegetables.

9. Cooked rice is spread in the fields which attracts birds and incidentally predate on *semi-looper* and other insects.

10. Take five kg of tobacco powder is soaked in five litre of water and add one litre of cow urine, keep for five days. Filter and dilute with 50 litres of water and spray to control the sucking pests.
11. Take two kg each of custard apple leaves, neem leaves and lantana leaves, crush them finely and boil with five litres of water. Filter this mixture, add one litre of cow urine and five gm of detergent soap. Dilute with 10 litre of water, and spray to control many pests in vegetables.

12. Take 25 kg of weeds from farm or from tank bund areas or from roadside. Add 200 gm each of jaggery, salt and tamarind. Mix all these items in a container adding 100 litres of water. Leave this mixture in a drum for 15 days. This mixture is stirred well, once in every three days. After 15 days the mixture emanates a bad odour and gets converted to liquid form. When this liquid manure is used for vegetable crops, it helps for the luxurious growth of the plant.

13. Take 1 kg each of the plant stems and leaves of *Ipomea fistula*, *Agave americana*, *Datura* spp, *Pongamia pinnata*, *Argemone mexicana*, *Annona*- *squamos*, shred and soak in a large pot with 10 litre of cows urine, and allow to stand for at least 10 days and then filter. The filtrate is diluted in a ratio of 1:6 with water, and sprayed on the affected vegetable crops. This is effective on all major vegetable pests like fruit borers, leaf eaters and root damagers.

14. Take 100 gms of garlic cloves, crush and soak in kerosene, and live overnight. 100 gms of green chillies are ground, soaked in
½ litre of water, and left overnight. Both solutions are filtered and mixed. 30 gm of soap powder is added and thoroughly mixed. The solution is diluted with water in a ratio of 1:5 and sprayed. It is effective on the pests like, **Diamond back** moth, **Fruit borer** and **Leafroller**.

15. Take 10 kg of cow dung, 10 litres of cow urine, two kg of Jaggery, two kg of groundnut cake, two kg of any cereal flour, two kg of Blackgram flour and mix with five litres of water in an earthen pot or plastic container. Allow it to ferment for 10 to 15 days under shade. This liquid is sufficient for vegetables in one acre of land.

16. Application of 200 ml of buttermilk to curry leaf plant every week, improves aroma, ensures availability of enzymes, vitamins and micronutrients.

17. The cut ends of plant cuttings are pasted with cow dung ball – Better sprouting and rooting – reduces desiccation and acts as growth promoter.

18. Root maggots in radish, onions, cabbage and mustard can be controlled by spreading fresh (not hot) wood ash around the plant roots. Ashes are then covered lightly with soil. Snails, slugs and cutworms can be controlled by encircling plants with
3-4 inch-wide and 1-2 inches deep trench and filling this trench with fresh wood ash. Pests will avoid crossing this trench.

19. Tomato flea beetles can be controlled by spraying a mixture of wood ash and water. Cucumber beetles can likewise be controlled by spraying a mixture of equal quantities of wood ash and powdered lime mixed with soapy water.

20. To preserve the bitter guard seeds place the cow dung on the wall like chappati. Take a ripen bitter guard seeds and press the seeds in the cow dung. It will dry automatically and use it for propagation.

21. Wood ash for every kilogram of seed to be stored, add 500 gm of fresh dry but cool wood ash, after the seeds have been put in the container in which the seeds are to be stored.

22. Lime also has insect repelling properties. For every kilogram of seed, use 50 gm of lime. The mixing can be done in the same container in which the seeds are to be stored.
23. Coconut oil or any other vegetable oil is especially for bean seeds. For one kilogram of bean seed add 2 teaspoons of vegetable oil, Mix the oil with 230 gms of seed and pour it into a clean container. Add the remaining seeds and mix till all the seeds are coated with oil. It helps the seeds to prevent from the pest.

24. Chilly seeds are immersed in biogas slurry for half an hour to promote vigorous growth and to impart disease resistance to seedlings.

25. Vegetable seeds of bitter gourd, pumpkin, snake gourd and ridge gourd are stored by mixing them with ash. It is widespread practice to plant these seeds after mixing them with ash that leads to better growth.

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