Vegetable Seedling Production

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What is the purpose of producing the plants?

The production of seedlings refers to the cultivation of plant seeds in a special place known as a nursery. Plants are grown here until they reach a specified and suitable size and are transported to a permanent place of cultivation. The success of seedling cultivation in the permanent field after seedling depends on the amount of seedling care and the provision of factors suitable for its growth in the nursery.

This technique is usually applied to vegetable crops (such as tomatoes, peppers, eggplant, cucumbers, plaster, melodies, lettuces, etc.). Other vegetable crops are grown directly into the ground, such as carrots, radish, peas, beans, etc. All field crops are sown directly into the ground, such as wheat, barley, chickpeas, lentils, black grain, cumin, eanson, coriander, etc.

What is the purpose of growing the seedlings in the nursery and later transferring them to the permanent place of cultivation?

There are many advantages to growing seedlings in the nursery, including:

1- During the 1-2-month production period of the seedlings, we can reduce the cultivation area to 1/100. Instead of growing seeds in large areas at intervals (which can be more than a meter in distances from one plant to another), these plants are already at the beginning of their development stage and do not require a large area. Thus, it's possible to grow them at short distances and in small spaces. Then, when they reach the right age or size, we move them to a permanent location for planting. Thus, we reduce the area occupied with growing vegetable plants to as much as 1/100% of the final area during this period.
2- Significantly reduce production costs: As they are produced and raised, the seedlings occupy limited space, thus saving the land (as mentioned earlier) and reducing the costs and efforts of servicing a large area.
3- With seedlings, it's possible to grow more than one crop in a field per season. While the plants are in the nursery, the empty field space can grow quick-growing crops such as Green onions, spinach, radish, etc.).
4- Maintenance and other operations can easily be carried out, such as irrigation, fertilisation, canning, and unique processes whilst the seedlings are in the nursery.
5- It's possible to get early crops. This is especially useful in areas under the threat of spring frost. Seeds can be grown early in the nursery, whilst the weather warms outside, as there is heating in the nursery. Early planting is impossible if seeds are sown directly into the ground, as heating

cannot be secured. Consequently, we can be up to two months early in planting if the seeds are planted in the nursery. We can then plant them in the field once they reach the appropriate size and there are good conditions outside.

6- As mentioned, we can protect the plants in the heating nurseries from the threat of frost to which the seedlings may be exposed when planting seeds directly in the field.

7- By early planting of seedlings in the nursery, we are able to grow a long-growing season of vegetables, which are transported to the field at about two months of age. Our crops are two months old by the time others are planting them in the field.

8- Reduction in the number of seeds, as all the seeds planted in the nursery, can be monitored and cared for individually. However, as for seeds that are planted directly in the ground, we are forced to double the number of seeds (sometimes 2-5 times) to ensure that the required density is obtained.

9- The possibility of selecting strong, healthy and homogeneous seedlings which accelerate the growth and introduction of plants with different phenological phases, increasing the quantity and quality of production.

10- The possibility of excluding exotic, sick, mutilated and vulnerable plants. All of these things are possible when the seedlings are produced in the nursery, whereas they are not possible when seeds are planted directly in the field.

Let's go back to the process of producing the seedlings. You mentioned that the seedlings are being grown in a special place. What does this space require?

In the production of seedlings, there are several possibilities to produce them:

I. Coverage without structure

The production of these seedlings shall be accomplished through the covering process of seedling, using polyethene or transparent plastic, and without the use of a skeleton, which is the simplest and least expensive method carried out by many farmers to obtain early production and at a minimum production of seedlings for marketing purposes. The technique consists of raising the earth from the two sides to form two 20 cm high, longitudinal dirt shoulders, on which are placed the punctured plastic sheet (50 microns thick, 180 cm wide). The seeds are then sown. The covering process is then performed, and the edges of the plastic sheet are buried on the sides of the long shoulders of the dirt. This method can achieve a very high degree of frost protection, especially at the early and critical stages of the shelf life. The time required to lift plastic sheeting varies according to the prevailing weather conditions and type of crop grown and ranges from 1 to 1.5 months, with the covers removed from the plants and left to grow until the end of the harvest.

Low plastic tunnels:

Such tunnels are built on fertile, well-ventilated, pathogenic and well-lit land and must be wind-protected as well - especially at the end of winter and early spring by securing or planting wind buffers.

The tunnel is 50-60 centimetres high, 50-150 centimetres wide, and 20-25 meters long or more. The temple is a semicircular arc of metal, wood, or hardened plastic. It stabilises the sides of each arc in the soil. There is 1 meter between each arc and the next arc. After planting seeds and installing arches, the plastic cover is added. A transparent polyethene cover with a thickness of 50 microns and a width of 2 m and height is used, depending on the length of the tunnel. Plastic sheeting is secured by digging in the dirt on either side of the tunnel. The plastic sheeting is placed at the end of the tunnel and then buried in the dirt. Or it's fixed in place by putting sandbags on the ends of the tunnel. This is the most dynamic method, especially as the cover is lifted in warm weather and returned by night and cold. The ends of the tunnel, on either side, are either sealed by burial or rolled up and fastened with metal or wood stakes that are stilled in the soil.

This method can provide sufficient heat, light, and humidity to germinate seeds of certain vegetable species and give seedlings that can then be raised in a permanent place of cultivation. Ventilation for seedlings is required after seeding has taken place (approximately 15 days after planting). In warm times, the ends of the tunnels are opened in the afternoon. As the seedlings' age progresses, ventilation periods increase with the possibility of partially lifting the lid from the sides on warm days. One week before the seedlings are transferred, the blanket must be completely raised.

III. Shrines

Seeds are sown in crates or shrines filled with a sterile soil mixture of earth, sand and humus (in units of equal size). The soil's surface is flattened in the box, and the seeds are sown in lines between (5-10) centimetres apart and less than 1 cm deep. The seeds are then covered with a thin layer of 0.5 cm of dry soil mixture. A layer of transparent plastic then covers the seeds to expedite production. When it is time for the seedlings to be removed to the place of planting (after the second real leaf is formed), the mixture is moistened. Finally, the seeds are carefully transported to the location of planting.

IV. Protected homes

These are improved models of low-cost tunnels, where there is sufficient space and height for workers to move around and perform various service operations for the winter. The way seeds are sown in protected homes varies depending on the availability of supplies for farming.

- **If the farming takes place directly in the protected land of the house**

, seeds are planted directly in the protected seedling house. These tunnels (protected houses) provide maximum sunlight by day and maintain a good amount of heat at night for the plant. Seed is sown in tubs and terraces, or in lines 10-15 cm apart.

Host:

Is it possible to ask: Which method is better and why?

Of course, farming in lines is preferable for the following reasons:

1- Ability to distribute seeds regularly.
2- Seeds sown in some lines help lift the soil cover so that they can grow more easily and quickly.
3- Plants find room to grow, the neighbouring line being far enough.
4- Weed control made easy.
5- Ease of taking off the seedlings when preparing them for permanent seating.

Host: Are there specific conditions for soils in nurseries or shrines?

1. You need good, fertile soils because there are large numbers of plants per unit area.
2. Light, loose, not cracking when dry.
3. They hold nutrients, not lose them with sewage.
4. The land is well fertilised with fermented and sterile municipal fertiliser at a rate of 5 kg/m^2.
5. The earth is fertilised with chemical fertilisers and for every 1 m^2 at a rate of 20-30 g ammonium nitrate, 40-60 g superphosphate, 30-50 g potassium sulfate.
6. Soil is free of pathogens, such as (Nematoda, the wilting fungi, etc.)
7. salty free and uninfected with weed seeds.

Host: You mentioned that seed planting is done directly in the protected home. Are there other ways or means to plant seeds?

- **Yes, seeds can be sown in special containers:**

The plants resulting from it are quick to adapt to the new medium by retaining their radical mass during sepsis.

Different types of vessels are used and can be divided into:

أ- **Reused containers:** used several times and filled out each time with the appropriate agricultural blend, namely:

1- plastic stories.
2- Seedling fast production trays.
3- Plastic trays.

ب- **Non-reuseable containers** which were filled with or containing food.

1- Turbine properties.
2- Paper storage.
3- Food cube.
4- Jiffy disk.

أ- **Reused plant vessels:**

Plastic stor

- age of different dimensions.
- They should be filled with this mixture consisting of the following size units:
  (1) Earth + (1) organic fertilizer + (1) sand
  (2) Earth + (1) organic fertilizer + (1) sand
- For ease, the soil should be placed in wooden, metal or plastic boxes at the dimensions (40 **x** 50 cm), or (35 **x** 50 cm), and at an altitude (10 cm).
- Seeds are grown at a rate of 1-2 seeds per crop.
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Quick production trays:

- Cork (styrofoam) plates.
- Each tray contains a number of cone holes that vary according to the area of the tray, the size of the holes, and the distances between them.
- Most common are plates containing (84) holes deep (3 cm) and a distance between holes of 3-5 cm.
- In each hole, 1-2 seeds are planted.
- When cultivated, the seedling is removed entirely from the plate, and its roots are completely removed with the mass of soil along with it.

Farming steps using cork trays:

1- Cleaning out the trays from the remnants of the previous planting.
2- Fill the trays with a clean and sterile mixture.

3- Opening small holes to grow seeds.
4- Growing seeds in holes.
5- Dry mixture seed cover.
6- The irrigation of trays after planting seeds and covering them with dry mixtures.
7- Put the trays on the tables.

Plastic trays:

- Each tray contains several holes for roots growth.
- The seedling needs to be entirely removed with its roots when **it is** quartered.

ب- Non-reuseable bags:

plastic bags

Small black plastic bags that are similar to plastic sheeting in terms of properties yet are cheap and easy to use compared to plastic sheeting. However, they must not be reuseable or degrade in soil, shredded when planted and discarded, and are not considered environmentally friendly.

Peat-Pot t

- rays:
- Trays of different sizes.
- Single or continuous in groups that are separated during displacement.
- They are filled with nutrients and seeded.
- Seedlings are sown with stones, which break down roots and penetrate the soil.

⇦ The plants in these containers are prone to a lack of nitrogen caused by microorganisms in the walls that absorb nitrogen from the soil. This problem is addressed by adding ammonium sulfate to irrigation water at a rate of 7,5 g/l water.

Paper-Pot Stack:

- Pressed vessels made of paper in cubes or beehives.
- They are located on the nursery floor, and the vegetation appears in squares or beehives, open from the top and bottom.
- Each unit has several containers ranging from 20 to 250 depending on the size of the container.
- In sedimentation, the growing plants are watered, making it easier to separate the vessels from one another and transplant them, while seedling into permanent land.

Jiffy-Pot Disk:

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- It is placed in a thin, flexible network.
- Available in different sizes: (Jeff 7) and Jeff 9.
- When soaked with water, these disks expand quickly and resize before compressing.
- A single seed is planted in each disk and covered with soil.
- When planting, the whole disk is placed in the soil without taking off the net.

Food cubes:

- These cubes are made by preparing an appropriate food blend composed of: (1 Earth+1 compost) or (1 Turbo+1 compost), to which are added various nutrients in their absorbable form.
- Water is added, mixed, moulded into special moulds or boxes and forced into a holding device.
- The partitions are then divided into dimensions (4.5 x 4.5 x 6) cm or (10 x 10 x 10) cm, depending on the crop, species and age of the seedling.
- 1-2 seeds are planted in each cube, and then the seeds are covered with a layer of the dry mixture.
- The whole cube is grown with the seedling without damaging the plant's root mass, so it's imperative for hard to sow vegetables.

Note:

All types of container would do best on tables topped with metal mesh, as this facilitates drainage of irrigation water. However, if these tables are not available, the containers shall be placed on the floor after covering the surface with a polyethene plate. This shall have the following advantages:

- Ensure that roots in soil do not develop and are therefore not segmented during sedimentation.
- Protection of plants against the development of different pests
- Ease of transferring seals to the field for presence on a single plastic sheet.

- **Seed preparation for agriculture:**

1. Choose large, high-volume, homogenous seeds.
2. Soak the seed in water or a salt solution for 5 minutes to find only the high-density seed and exclude any empty seed.
3. Sterilise seeds either thermally (placing seeds in hot water 50 m for a period that varies according to crops, cabbage 20 min, watermelon and pepper 2 hours) or chemically (treating

with chemicals, phosphoric acid 15% for one hour, potassium permanganate 1% for a quarter of an hour). These steps allow the elimination of pathogens transmitted by seeds.

4. The treatment of seeds by solutions of major and minor nutrients for a period of 12 hours (25° C.). This step leads to more robust plants and accelerates their growth.

The process of preparing seeds before planting is of great importance:

1- Homogeneous seedlings.
2- Increasing the capacity of plants to withstand unfavourable environmental conditions.
3- The rate at which plants enter different physiological stages.

Environmental factors appropriate to vegetable seedlings' growth:

Heat: Temperatures can produce a significant effect on seedlings. Proper heat must be provided for plants and growth. Hypothermia can stop growth, and extreme hypothermia can kill the seedlings. High temperatures can accelerate growth and give a thin, weak sheeting. In general, winter vegetation (such as cabbage and lettuces) requires a temperature of 16-18 m/day (less than 5°C). Summer vegetable seedlings (such as tomatoes, peppers and cucumbers) require a temperature of 20-25 m/day (and less by 5°C).

Moisture: Sufficient moisture is needed to produce seedlings. The moisture depends on the vegetation and the thickness of the seed case. Early irrigation is achieved by irrigation systems or by using hand sprinklers. This preserves the seeds and prevents them from being disturbed and collected at the end of the agricultural basin. Attention must be paid to the regularity of the irrigation processes to avoid an increase in moisture, which leads to the rotting, fungal diseases and non-germination of the seeds. Lack of moisture also causes small, weak seedlings. Melted fertilisers can also be added to irrigation water.

Light: Light can affect seed germination: some species require light to germinate as lettuce seeds; others, like onion, are discouraged by the presence of light. The intensity of lighting also plays a significant role in the quality of seedlings. Low-intensity lighting results in lengthy, delicate and weak seedlings. Industrial lighting can be relied on, whether as supplementary lighting in the event of inadequate lighting or full artificial lighting in the event of a loss of lighting. Sodium lamps or mercury can be used. Tube neons or standard 12-volt machines can be used.

Ventilation: Oxygen must be available to ensure that seeds can be germinated. High levels of CO_2 inhibits germination. Bear in mind that germination produces CO_2, which can be a problem in poorly ventilated environments.

Dates for planting seeds:

The time at which seeds are sown varies with the crop type and the agricultural material

dispersion	seed cultivation	germination time	optimal heat for germination	loop	yield
October	September	5-10 days	22-25 °C	winter	cucumber, peppers, tomato
March	K-2 February	5-10 days	22-25 °C	summer	Cucumbers, peppers, tomatoes
1-2 months	August and September	10 days	15-18 °C	winter	winter veggies: Cabbage, lettuce, etc.

Seedling:

When cultivating seedlings, the following shall be observed:

- ✓ First, you need to gradually aerate the seedlings and expose them to external conditions (heat and light). This process should occur over one week to harden the plants and adjust them to their new environment.
- ✓ The operation should occur when the temperature and the intensity of the optics are not high. The best time is the evening or the early morning.
- ✓ Plant the soil up to the level of leaves (to help form fibrous roots enabling plants to enter quickly with their different phenological phases).
- ✓ It is preferable to irrigate the seedlings after they are cultivated with warm water, which is added to manganese precursors at a rate of 1.5-2 g/l water.
- ✓ In low-temperature farming, the seedlings can be covered with transparent polyethene sheets or placed in low plastic tunnels. The blankets can be left there until the plants touch the top of the tunnel.
- ✓ In high-temperature farming, the seedlings may be covered with a sheet or plastic caps, which dilute the heat and light. The caps can be removed once the seedlings are properly grown and successfully cultivated.

Defects in use of sebum:

Temporary halt in plant growth immediately after sepsis: If the pause continues for a long time, it will lead to delays in the development and entry of plants in their various phases, thus delayed maturity and reduced production. The following factors influence the length of the temporary pause in growth:

1- The time it takes to transport: The longer the time increases, the longer the break lasts because it increases the segmentation of roots. This is because the more often congested seedlings are separated into larger distances, and after reaching the right size, they are moved to the permanent location.

2- Plant size at sepsis: The larger a plant, the longer it will take to outgrow it after pollination, the lower the formation rate of new roots as plants age.

3- The duration of a plant's existence is subject to a lack of water absorbed by the cutting down of roots.

4- External conditions surrounding a plant: These are the atmospheric conditions that influence the rate of transpiration, especially after preparation and new roots.

5- The number of roots remaining after uprooting the seedling.

6- The remaining roots' water absorption capacity is related to the proportion of suction radial filaments.

7- Speed of formation of new roots after segmentation.

8- Plant natural growth rate: Fast-growing plants are faster to pollinate than slow-growing plants.

Intolerability of the process: Vegetable crops differ in their ability to withstand sedimentation due to differing abilities to replace roots lost after take-off and due to the varying abilities of the remaining roots to absorb water during the first days after sedimentation. Depending on the degree of endurance of the sedimentation, plants are divided into three groups:

2. Easy-to-plant crops (potential for seedling): tomato, lettuce, cabbage.
3. Medium-term crop: Their operation requires special care, including eggplant, peppers, celery crops.
4. Crops hard to plant (not able to sustain seedling): It's like a village.

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There's a spread of vegetable-grafting technology. Can you talk about it and introduce listeners?

It is an essential technique in the process of producing seedlings. It was applied simply about a century ago. Currently, it constitutes the largest percentage of seedlings produced, especially for the eggplant family.

Grafting is the process of combining two parts of vegetation to form a new common plant; The first, parent (Rootstock), by means of a strong root group and a small piece of its stem, provides the new plant with the food necessary for growth, adds extra growth strength and bears more of the various stresses of the soil; The second is the bait (Scion), the antenna of the new plant, which is responsible for the expected production characteristics.

When did vegetable grafting begin, and how did it develop?

The first time vegetables were grafted together was in Japan and Korea in the late 1920s, when a watermelon was combined with a squash. Since then, the cultivation of grafted vegetables has become an essential technique in vegetable production in Korea, Japan, and some Asian and European countries. It is beneficial in countries with limited agricultural areas, which are unable to apply agricultural cycles, and thus are prone to various soil diseases and pests. This technique has been adopted as an alternative to using soil sterilisers to reduce the spread of soil diseases, lengthen the growing season and increase farm productivity. It has also been adopted as a critical application in organic and persistent agriculture. Indeed, in many countries (Japan, Korea, Greece, etc.), the proportion of vegetables reared has reached nearly 100% of the total crop of vegetables produced.

What is the importance and benefits of feeding vegetables?

I. Stronger growth and improved productivity

Grafting vegetables improves the strength of the plants and increases their size and weight. In addition, plants' productivity also increases; gypsum, cucumber, tomatoes, and eggplants are shown to produce more and larger produce. This increase in total vegetable growth and productivity is beneficial, as it can reduce by half the number of plants in the unit area yet maintain the same amount of production. As well as this, plants can be reared on two or more legs, thus saving a large amount of feed−in costs.

Studies have shown that the increase in growth strength and productivity is due to the plant's improved root mass and its large capacity to absorb water and nutrients from the soil (phosphorus, nitrogen, calcium, sulfate, iron). This increases total vegetable growth and increases photosynthesis, thus forming and developing fruits, increasing production and improving quality. In addition, an increase in absorption of soil mineral materials reduces the loss of these elements, allowing large amounts of added fertilisers to be loaned, and decreases soil waste to contribute to environmental conservation.

II. Resistance to inadequate environmental conditions

Grafting plants is a practical solution for overcoming many environmental conditions that are not conducive to plant growth. These include high salinity, marginal temperatures, excessive soil moisture and soil acidity.

Intense salinity

Too much soil salinity is a major reason why large agricultural areas are excluded from usability. However, the use of plants that can tolerate (tomato, gypsum) high salinity levels has been found to allow up to 80% productivity compared to healthy soil agriculture. In addition, these assets prevent the transfer and accumulation of sodium and chlorine shard in the leaves of the plants.

Limit temperatures

All vegetable plants are very sensitive to marginal temperatures (high or low) and are especially in the reproductive stage of growth. Plants grafted on high–temperature assets have produced a marked increase in vegetable growth and production. Also, vaccination of cold-resistant assets has increased vegetable total growth and productivity. Thus, the main benefit of using an asset that is resistant to high or low heat leads to prolonged growth season (early production with long growth season), thus increasing productivity while stabilising production distribution during the year.

High soil moisture

Most tropical vegetable plants are characterised by a weak tendency to evolve in hot and humid (permanent rain) separation. It is therefore recommended that these plants be combined with a plant from a potentially high–moisture root group. For example, the combination of the tomato on eggplant origins yielded excellent results in resisting high moisture.

Soil acidity

Plant species and varieties have different tolerances of acidity and soil base. Thus, a vegetable grafting technique allows the cultivation of soil acidity–sensitive plants if appropriate tolerant assets are selected.

Resistance to soil pests and diseases

Vegetable crops in many countries, especially those with limited agricultural areas, are cultivated extensively and continuously, often in protected homes. The focus is also on one agricultural crop, the most economical and profitable. This creates ideal conditions for the development of many pathogens and soil parasites.

Chemical soil sterilisers effectively controlled these pathogens, but these have now been shown to have a residual effect on crops and cause severe environmental damage. Therefore, a vegetable–grazing technique was introduced and adopted as a fundamental solution for producing repetitive vegetable plantations without sterilising the soil. The method of grafting resisted the most devastating soil diseases:

Fungal wilt, root rot, turbine root fibrosis, nematode, tomato virus, bacterial wilt, halogens, and other soil diseases and pests affect the plant's root group.

Are all vegetable compatible for grafting?

Plants have to have compatible taste and origin. Grafting does not work between different vegetable species. Interspecies grafting is very successful for many vegetables, however. For example, cucumbers can be grafted with pumpkins, plaster or yellow watermelons. Tomatoes can be combined with eggplant or peppers. It should be noted that biphenyls can be easily grafted and that it is difficult to graft monocoagulants.

Are there specific conditions for grafting to work?

- ✓ Reduction of irrigation of plants in use to avoid long and delicate growth
- ✓ Both plants must be strong, healthy and free of all diseases
- ✓ Take into account the difference in the dates of cultivation of the plants.
- ✓ The vaccination process is carried out in completely sterile conditions, far from the possibility of any contagion (special and sterile dining room – sterile vaccination tools);
- ✓ Physiological compatibility between the taste and the origin, through the choice of the right plants.
- ✓ Mechanical compatibility by ensuring full rejoining of the moveable vessels (cambium) between graft and origin (sharp blades, entirely smooth surfaces)
- ✓ Secure the plants in place after grafting (use of grafting specific and well-sterilised pads)
- ✓ Ensure ideal conditions for the fusion of vector vessels (heat, moisture, lighting, ventilation, sterilisation, etc.)

What are the tools and supplies for vaccination?

- ✓ A suitable slash or cutting code (razor blade);
- ✓ special fastener posts;
- ✓ empty seedling trays;
- ✓ The appropriate mixture from the centre of agriculture (Torp, Bitmos)
- ✓ Private and protected doping rooms (shaded, off-air
- ✓)
- ✓ Experienced and trained workforce. It should be noted that vaccination can be done automatically using special machines, saving a lot of effort, time and costs.

What are the stages of the grafting process?

Seeds are grown for ceramic wool inoculations (2 cm diameter). Seeds of origin are first cultivated, followed by seeds of graft, at a time difference, depending on the method. Plants are left to grow in sheltered house conditions (25°C, 85% humidity). After a week of growing and developing, well-developed assets and foods are sorted to ensure the vaccination's success.

After the grafting is completed, the mill is moved to particular rooms, where it is kept in the dark for 24 hours and then exposed to 3 hours of light every day for 6 days. High humidity (above 85%) and a temperature of 20-25 m are required. Generally, from day eight, it's possible to see if the process was successful, and the plants are transported to the protected house for domestication (20-25°C, 60% humidity). Once the plants have adapted and are growing normally (approximately one week), they are transported to larger stocks or directly occupied in the soil or farm.

What are the most common grafting methods?

1- dental immunisation

For this method, both plants should be cultivated at the same time. First, a tongue is operated within the original and similar to the bait (opposite direction). We then insert the two teeth into each other and wrap them with tape (or vaccination clip) to tighten the lockdown and fix. After the rejoining is done, we cut the bait from under the grafting area, and the origin is cut over the grafting area. This method has a very high success rate.

2- tubular immunisation method

This method is the most modern and has gained widespread popularity because of its ease and high success rate. It relies on cutting the origin over the Foliage area and cutting the bait, leaving at least two actual leaves. After the origin and the bait (45° diagonal slash) are cut, their coalescence is secured by clips. Now, small plastic pollinators have replaced raffia silks because they are easy to install and provide fast food-to-origin interface without damaging the plant. And since the two plants have been cut, so the plant in this area is very delicate. The plants must be kept in insulation and dark plastic sheeting for several days, with more than 85% humidity. Nevertheless, this particular form of pollination is so effective that it can be applied early in a plant's lifespan, obviating the need for large living rooms. This method is particularly suitable for vegetable plants, especially tomatoes. They have a 90-100% success rate and were recently developed for automatic grafting. There are other methods such as cutting, vertical hole or side hole vaccination.