# ****1、Introduction to Strawberry Production Fundamentals****

Strawberries, also known as yangberry, ground berry, ground fruit, red berry, etc., belong to the berry fruit tree category in horticulture. They are native to Europe and were introduced to China in the early 20th century, becoming popular throughout the country. Strawberries have a heart-shaped appearance, bright pink color, juicy flesh, sweet and sour taste, pleasant aroma, and rich nutrition, hence they are known as the "Queen of Fruits". Rosaceae, strawberry genus, perennial herb. There are creeping branches, compound leaves, 3 small leaves, elliptical shape.

Flowering in early summer, inflorescence with white or slightly red flowers. The receptacle enlarges and becomes fleshy, and the achene matures in summer, gathering on the receptacle to form a red berry like body. Strawberries are a perennial herbaceous fruit tree with high nutritional and economic value, widely distributed. Their fruit is brightly colored, soft and juicy, moderately sweet and sour, and rich in nutrients. They are also suitable for protected cultivation and are listed before New Year's Day, with high economic benefits.

Rosaceae strawberry is a perennial evergreen herb. The main types are oriental strawberry, forest strawberry, green strawberry, Chilean strawberry, and Welsh strawberry. Distributed in the Northern Hemisphere and South America, with the highest number in Europe, followed by the United States, Japan, North Korea, Mexico, Canada, and others. China mostly plants in the suburbs of large and medium-sized cities. The cultivated varieties are mostly Weizhou strawberry, Chilean strawberry, and their hybrid offspring. Strawberries have short and thick rhizomes, and new stems grow upwards year by year. The new stems have long stalks and three compound leaves. The inflorescence grows at the top, with white or light red flowers. After the flowers wither, the receptacle swells into juicy aggregated fruits, which are red or white, spherical, oval or elliptical in shape, with many small seed like achenes. I prefer warmth, humidity, and good sunlight, but I am not tolerant to severe cold, drought, and high temperatures. The root system consists of adventitious roots on new stems and rhizomes. The rhizomes begin to die after 3 years, with the highest yield in the second year and a decrease after 3 years. Propagation using creeping stems in autumn. Planting strong seedlings, applying sufficient base fertilizer, and renewing after one season of harvest can achieve high yields year after year. Both open field and greenhouse protected cultivation are suitable. Using stem tip and anther culture can quickly obtain non-toxic seedlings and accelerate the breeding of new varieties. Strawberry fruits are rich in vitamin C, iron, and various minerals. Can be eaten fresh and used to make jam, juice, and fruit wine; Fresh fruits that are frozen can be stored and transported with good quality.

The current situation of strawberries in China: China has the richest wild strawberry resources in the world, and has been using wild strawberries for a long time and has been using them ever since; The cultivation of large fruit strawberries in China began in 1915, but it has not received much attention in the past and has developed slowly. Currently, the strawberry production area in China is about 1 million acres, ranking first in the world. The key strawberry production areas include Dandong in Liaoning, Baoding in Hebei, Yantai in Shandong, Suburban in Shanghai, Shuangliu in Sichuan, and Lianyungang in Jiangsu.

**1.1 Temperature requirements**

The above ground part of strawberry plants grows at a suitable temperature of 15-25 degrees Celsius, and their photosynthesis is at a suitable temperature of 20-25 degrees Celsius. Growth is poor below 10 degrees Celsius, and photosynthesis and growth are inhibited above 30 degrees Celsius. The above ground plants begin to grow when the temperature reaches 5 ℃, suffer from freezing damage at -7 ℃, and freeze to death below -10 ℃.

The most suitable temperature for root growth is 15-23 degrees Celsius, and the flowering period is below 0 ℃ or above 40 ℃, which affects pollination, fertilization, and normal seed development, leading to abnormal fruit production. Flower bud differentiation must be carried out between 5-17 ℃.

**1.2 Moisture Requirements**

Strawberries have shallow root distribution, numerous and large leaves, and are sensitive to water. They prefer moisture but are afraid of waterlogging. Different growth stages require different amounts of water. During the germination and flowering stages, the soil moisture content should not be less than 70% of the maximum water holding capacity, and air humidity should be between 40% and 60%. The fruit swelling period requires over 80%, while the flower bud formation period should maintain around 60%.

Normally, standing water can affect the growth of roots and plants. In severe cases, leaves may turn yellow, wither, fall off, and even cause plant death. Therefore, watering should be done less and more frequently.

**1.3 Lighting Requirements**

Although strawberries are light loving crops, they are more tolerant to shade. When the light is strong, the plants are low and thick, and the fruits have high sugar content and strong aroma. When the light is insufficient or the planting is too dense, the leaves are thin, the petioles and flower stalks are slender, the leaf color is light, the flowers are small, the fruits are small, the taste is sour, and the maturity period is delayed.

Strawberries have different requirements for light hours at different growth stages. The flowering and fruiting period and the beginning of growth period usually require 12-15 hours of sunshine, while the favorable sunshine hours for flower bud differentiation period are only 12 hours. The sunshine hours for strawberries to enter dormancy period are within 10 hours.

**1.4 Soil Requirements**

Strawberries are suitable for growing on loose, fertile, breathable, and well permeable sandy soil. The suitable pH value is between 5.5-6.5. Clay, saline alkali soil, and marshland are not suitable for growing strawberries. Strawberries are suitable for growing in soil with a groundwater level not exceeding 80-100cm. Throughout one's life, they absorb the most nitrogen and potassium, followed by calcium and phosphorus. Strawberries are planted in autumn and their absorption intensity of nutrients increases from small to large. The period when the plants absorb the most nutrients is at the end of flowering and fruiting. At this time, the plants absorb a large amount of nutrients, laying the foundation for the development of creeping stems and seedlings.

**1.5 Soil preparation and moisture management before planting**

Before planting strawberries, sufficient base fertilizer should be applied. 3000-5000 kilograms of fully decomposed organic fertilizer and 30 kilograms of nitrogen, phosphorus, and potassium compound fertilizer should be applied per mu, half a month before planting. Spread the fertilizer evenly and thoroughly plow the garden soil 2-3 times to ensure that the soil and fertilizer are fully mixed. Plow to a depth of 30cm and then open a ditch to adjust the soil moisture. The width of the soil moisture base is 80cm, the width of the soil moisture surface is 60cm, and the height is about 35cm.

**1.6 Temperature Management for Planting**

Timely insulation is a key measure to promote cultivation. According to the weather conditions, when the temperature drops to 5-8 ℃ at night, the shed should be insulated. The temperature requirements for different growth stages are different. At the beginning of insulation, in order to prevent plants from entering dormancy and dwarfism, and promote the development of flower buds, a higher temperature should be given. The temperature should be 28-30 ℃ during the day, with a maximum of 35 ℃, and 12-15 ℃ at night, with a minimum of 8 ℃. Blooming period: 25-28 ℃ during the day and 10 ℃ at night. The suitable temperature for flowering period is 25-30 ℃ during the day and 8-10 ℃ at night. If the temperature is too low, the anthers cannot be dried

**1.7 Application of Gibberellin in Production**

Spraying gibberellin on strawberries has the effects of breaking dormancy, promoting plant growth and development, advancing phenology and maturity, and increasing yield. Especially in promoting cultivation, it has a significant effect on breaking dormancy and overcoming plant dwarfism. The optimal application period is generally around 7 days after the greenhouse is insulated (i.e. from germination to budding stage), with an optimal concentration of 5-10ppm and a dosage of 3-5 milliliters per plant. If the concentration is too high, excessive growth may occur, resulting in reduced yield.

**1.8 Planting Period and Key Points**

The planting period for strawberries is from late August to early September. Small seedlings can be planted early, while large seedlings can be planted late. If the soil is too dry, watering can be done 1-2 days before planting to create moisture. The planting effect is better when the soil on the moisture surface is half dry. Double row planting of large fruit varieties such as Hongyan, with row spacing of 20-25cm and plant spacing of 20cm, planting 5500-6000 plants per mu.

The principle of "deep without burying the heart, shallow without exposing the roots" should be followed when planting seedlings deeply. If it is too deep, the seedling heart is easily buried by the soil, causing the seedlings to rot and die; Too shallow, with exposed roots, the plant is prone to premature aging. After planting, watering should be done in a timely manner. Maintaining a moist soil surface is the key to plant survival. The water content should not be too much or too little, and the soil moisture content should be kept at around 80%.

**1.9 Humidity regulation for planting**

After insulation, the relative humidity inside the greenhouse will be very high, and in the morning before ventilation, the relative humidity can often reach 100%. Excessive or insufficient humidity can affect the flowering growth of plants and induce various diseases. Therefore, dehumidification is an important task. Normally, it is necessary to ventilate and remove moisture at noon every day, but it should be noted that the temperature should not be lowered for the purpose of moisture removal. Humidity requirements at different stages: 60-80% during the budding stage, 30-50% during the flowering stage, and 60-70% during the fruit ripening stage.

**1.10 Water and fertilizer management during the growth period**

(1) Watering:

After insulation, the evaporation of soil moisture accelerates. Despite being covered with plastic film and greenhouse film, the soil is prone to water shortage when thrown away. Strawberries are plants that prefer water and are afraid of waterlogging. Therefore, they should be watered regularly to ensure sufficient soil moisture. The watering principle is "wet but not waterlogged, dry but not dry".

To determine whether watering is necessary, one should observe the moisture content on the leaves in the morning. If there are water droplets at the edge of the leaves, indicating water splashing, it can be considered that there is sufficient moisture. Conversely, if there is water shortage, timely watering is necessary.

(2) Topdressing:

In addition to applying sufficient base fertilizer, topdressing can be carried out before covering with plastic film, during the budding stage, during the fruit swelling stage, or during the peak harvest period according to the growth of the plant. The interval between fertilization is 20 days in the early growth stage and 1 month in the late growth stage. Apply 5 kilograms of high-quality water-soluble fertilizer per acre each time, and water promptly after fertilization.

In addition, spraying 2-3 times of boron fertilizer during the early and peak flowering stages of strawberries, followed by spraying 2-3 times of calcium fertilizer, can significantly improve the fruit setting rate and large fruit rate. Topdressing outside the roots can be sprayed with 0.3% potassium dihydrogen phosphate every 7-10 days.

**1.11 Plant Growth Management**

Strawberries need to have their creeping stems, old leaves, and diseased leaves removed in a timely manner throughout their entire growth period. Typically, each strawberry plant retains 10-15 leaves. Remove excess flower buds before flowering, retain the first and second order flower buds for large fruits, and retain the first, second, and third order flower buds for medium-sized fruits. When a large number of axillary buds occur in the plant, they should be removed in a timely manner to save nutrients and avoid affecting the development of the fruit.

**1.12 Benefits of Eating Strawberries**

Strawberries are rich in nutrients and various effective ingredients. Each 100 grams of fresh fruit contains 60 milligrams of vitamin C, which is higher than the content of apples and grapes. The fruit pulp contains a large amount of nutrients such as sugars, proteins, organic acids, and pectin. In addition, strawberries are rich in vitamins B1, B2, C, PP, as well as essential minerals and some trace elements such as calcium, phosphorus, iron, potassium, zinc, and chromium for the human body. Strawberries are an important source of essential components such as fiber, iron, potassium, vitamin C, and flavonoids for the human body. Strawberries, also known as red berries, poplars, raspberries, etc., are a general term for plants in the Rosaceae family and the genus Strawberries, with over 50 species worldwide.

Strawberries are rich in nutrients, including fructose, sucrose, citric acid, malic acid, salicylic acid, amino acids, as well as minerals such as calcium, phosphorus, and iron. In addition, it also contains a variety of vitamins, especially vitamin C, which is very rich. Every 100 grams of strawberries contains milligrams of vitamin C60. The carotenoids contained in strawberries are important substances for synthesizing vitamin A and have the function of improving eyesight and nourishing the liver. Strawberries also contain pectin and rich dietary fiber, which can help with digestion and smooth bowel movements.

The nutritional components of strawberries are easily digested and absorbed by the human body, and eating more of them will not cause them to catch cold or become overheated. They are a healthy food suitable for all ages. There are many ways to eat strawberries.

# ****2、 Biological characteristics of strawberries****

**（1） Morphological characteristics and growth and fruiting habits of strawberries**

Strawberries are perennial herbaceous plants in the Rosaceae family and the Strawberry genus. The plant is short and grows in a semi clustered state, with a height generally not exceeding 35 centimeters. Strawberry plants are composed of roots, stems (new stems, rhizomes, creeping stems), leaves, flowers, fruits, seeds, etc.

1. Structure and Function of Roots

Most strawberries reproduce asexually, and their root system is stem derived, mainly composed of adventitious roots, belonging to the fibrous root system. The root distribution is relatively shallow, with 70% of the roots distributed in a 30 centimeter soil layer. Due to the shallow distribution of roots, their tolerance to drought, high temperature, and cold is poor.

2. Types and growth characteristics of stems

Strawberries can be classified into three types based on their formation time, function, and morphology: new stems, rhizomes, and creeping stems.

(1) New stem: The central growth axis of strawberry plants is a shortened stem, and the shortened stem that germinates in the same year is called a new stem. It has a hunchback shape, and the inflorescence occurs uniformly in the direction of the hunchback. When planting, the planting direction is determined based on this characteristic.

(2) Rhizome: The shortened perennial stem of strawberries is called a rhizome, which is an organ for storing nutrients.

(3) A creeping stem is a special type of aboveground stem that sprouts from the axillary buds of a new stem in the same year, with even numbered nodes producing small leaves and adventitious roots, used for reproduction.

3. The shape of the leaves is evergreen, with three compound leaves.

4. Composition and function of flowers. Most varieties of strawberries belong to the category of bisexual flowers, with a clustered umbrella shaped inflorescence and self fruiting flowers.

5. Morphological characteristics of the fruit: The fruit of a strawberry is composed of a stem, sepals, receptacle, and achene. The part we usually eat is a fleshy fake fruit formed by the enlargement of the receptacle, which is also known as a berry in cultivation because it is soft and juicy. The true fruit of strawberries is the small achenes gathered on the receptacle, commonly known as "seeds" and botanically referred to as aggregated fruits.

**（2） Phenological period**

The growth and development process of strawberries in a year can be divided into the following stages:

1. Sprout and growth stage: This stage starts from the sprouting of the plant to the appearance of flower buds, with root growth being the main process. When the ground temperature stabilizes above 2 ℃, the root system begins to sprout; When the temperature reaches above 5 ℃, the aboveground parts begin to grow. This period focuses on promoting root growth and strong seedlings, and can use the company's 500ml rooting power source: it can break dormancy, promote rapid rooting of strawberries, with more roots, thicker roots, and stronger roots. At the same time, transplanting seedlings, diseased roots, dead roots, rotten roots, and not growing new roots have the function of enhancing root dynamics, achieving the goal of root replacement.

2. Blooming period: The upper part of the plant grows for about a month, and three leaves unfold on the new stem. The inflorescence begins to emerge, and the budding period lasts for about 15 days. In this phase, catalysis is mainly used. 10ml of the company's combined Yinong flower promoting and fruit expanding element or 10ml of the company's combined Yinong flower protecting and fruit expanding element is used. Each bottle is mixed with 15kg of water. The whole plant is spray to promote early flowering, more flowering, improve flower quality, facilitate pollination and fertilization, and improve seed setting rate.

3 flowering and fruiting period: This period refers to the period from the flowering of the plant to the maturity of the fruit. Generally, each flower can bloom for 3-4 days. As strawberry flowers are in a clustered inflorescence, they bloom in order of inflorescence level. The entire flowering period can last for about 20-30 days, and it takes about a month from flowering to fruit maturity. According to the characteristics of the flowering period, the company's 10ml United Yinong Qiangxiao Zuoguoling strawberry is used in the fruit setting period, mixed with 15kg of water, sprayed at the flowering period, once every 7-10 days, and evenly sprayed the whole plant spray. Its main functions are: (1) delaying flowering and pollination time, improving pollination rate; (2) regulating inflorescence, preserving pollination, enhancing fruit stalk flexibility, and preventing flower and fruit drop.

The characteristics of strawberry fruit development: Strawberry fruit is formed by cell division, which increases the number of cells and expands the cells themselves. The period of cell division is from the bud stage to the flowering or withering stage, with the peak of division occurring during the flowering stage. After withering, the number of cells increases and decreases, and in the later stage, strawberry fruits mainly rely on the expansion of cell volume for growth. Therefore, after flowering, the main focus should be on promoting cell division and accelerating swelling. 30ml strawberry swelling hormone, 30ml strawberry swelling and redness increasing hormone, or strawberry elongation and swelling hormone can be sprayed, mixed with 30 kilograms of water, and used from the initial fruiting stage. Spray once every 5-7 days and re spray the fruit surface to promote rapid cell division and swelling, achieving the goal of rapid fruit expansion/reddening/elongation.

From the outside of the fruit, strawberries grow relatively slowly within 15 days after flowering, and rapidly increase in size within 25 days after flowering, with an average daily weight gain of about 2 grams. Afterwards, the growth slows down again until 32 days after flowering, when it enters the mature stage and growth stagnates.

What are the environmental factors that affect fruit development

(1) Temperature: When the temperature is low, it takes a long time from flowering to maturity and the fruit is large; When the temperature is high, the fruit development time is short, the fruit is small and early maturing, and there is no yield. The temperature difference between day and night is large, the accumulation of photosynthetic products is high, the respiratory consumption is low, and the fruit is large and of good quality.

(2) Adequate light exposure leads to vigorous photosynthesis, high assimilation rate (converting other substances into their own required substances), abundant supply of carbohydrates to the fruit, and rapid fruit enlargement. If there is rainy weather during the fruit ripening period, the sugar content and vitamin C content in the fruit will significantly decrease, affecting the quality of the fruit.

(3) The soil moisture content in fresh strawberry fruit is generally between 88% and 93%. With sufficient soil moisture, the fruit swells quickly and has good quality. Insufficient moisture, withered and dull fruit, small fruit.

Secondly, low light exposure, excessive nitrogen fertilizer, and low fruit sugar content during ripening are the main causes of white fruit disease (the inability of berries to color properly during ripening).

4. Vigorous growth period: After fruit harvesting, the plant enters a vigorous growth period, with a large number of axillary buds creeping, new stem branching accelerating growth, adventitious roots forming at the base of the new stem, and a large number of seedlings forming. During this period, it is necessary to promote nutritional growth, strengthen the management of split seedlings, and do a good job in weeding, drainage, and pest control. At this stage, it is necessary to promote nutritional growth. The company can use 30ml brassinolide or 45g Shuangxiaowang, add 15kg of water, evenly spray the whole plant spray, promote its strong growth, fat stems and tender leaves, promote the enlargement and thickening of leaves, increase chlorophyll content, and improve photosynthesis efficiency.

5. Flower bud differentiation period: After vigorous growth, with the decrease of temperature and the arrival of short days, flower buds begin to differentiate, marking the plant's transition from vegetative growth to reproductive growth, and the nutrients produced by leaves are transferred to roots and stems. If the flower bud differentiation is not good during this period, the quality of the anthers and pollen formed will not be high, which will seriously affect pollination and fertilization, leading to the production of malformed fruits.

In late autumn and early winter, as the temperature further decreases and the sunshine becomes shorter, strawberries stop growing and begin to enter the dormancy stage. This is a cold resistant physiological state formed by strawberry plants adapting to low temperatures in winter. The period of dormancy varies in different regions. The dormancy period of strawberries in Beijing usually begins in late October, enters deep dormancy in mid November, and gradually disappears after mid December. Therefore, the external factors affecting strawberry dormancy are mainly sunshine length and temperature. Generally, long days promote growth, while short days promote dormancy. Experimental results have shown that the influence of sunlight length is greater than that of temperature. The intensity of light is also a factor that affects strawberry dormancy. Even under long day conditions, if the light is too weak, it can cause plant dormancy. Therefore, the temperature in this period is low. The company can use 100ml of strong antifreeze, add 60kg of water, and evenly spray the whole plant spray, so as to improve the drought and frost resistance of crops and reduce the occurrence of freezing damage.

**（3） Requirements of strawberries for environmental conditions**

1. Soil: Strawberries prefer slightly acidic sandy loam soil rich in organic matter, with a suitable pH value of 5.5-7. Cultivating strawberries in boron deficient sandy soil is prone to fruit deformities and severe flower and fruit drop.

2. Moisture: Strawberries have different water requirements at different growth stages, and the field water holding capacity should be maintained at over 70% during the flowering period; During the fruit swelling period, the field water holding capacity should be maintained at over 80%; During the ripening period of berries, appropriate water control should be implemented to maintain a field water holding capacity of over 70%; Reduce water appropriately during the flower bud differentiation period and maintain the field water holding capacity between 60% -70% to promote flower bud differentiation.

3. Temperature: The minimum temperature during flowering and fruiting periods should be above 5 ℃, and the most suitable temperature for strawberry plant growth is 15-25 ℃; The optimal temperature for light and interaction is 20-25 ℃; The suitable temperature for flowering is 15-24 ℃, and the optimal temperature for flower bud differentiation is 17-25 ℃; The optimal temperature for fruiting is 25-27 ℃; The suitable temperature for fruit development is 18-22 ℃.

4. Light exposure: Strawberries are light loving plants, but they are also shade tolerant. During the flower bud formation period, they require 10-12 hours of short sunlight and lower temperatures per day. If artificially treated with 16 hours of long sunlight per day, flower bud formation will be poor, and even flowering and fruiting may not be possible. However, providing sunlight treatment after flower bud differentiation can promote the development and flowering of flower buds. During the flowering and fruiting period as well as the vigorous growth period, strawberries require 12-15 hours of sunlight per day.

# ****3、 The breeding method of strawberries****

There are four ways to reproduce strawberries: creeping propagation, division propagation, tissue culture propagation, and seed propagation. The first three are asexual reproduction, and the offspring can maintain the original characteristics of the variety. Seed propagation is sexual reproduction, and the offspring have large variation.

**（1） Creeping propagation**

The creeping propagation method is commonly used in strawberry production, which is simple in method and easy to manage. It can directly collect seedlings from the production field and establish a specialized nursery. Strawberries will sprout a large number of creeping stems from lateral buds on new stems during their vigorous growth period, and produce seedlings on the creeping stems. Using these creeping stem seedlings for reproduction is called creeping stem propagation. The advantages are:; The advantages of high reproductive coefficient, high seedling quality, conducive to crop rotation, and beneficial for reducing pests and diseases.

**（2） Separate propagation**

Also known as root stem propagation or split stem propagation, this method is suitable for two situations: first, in an old strawberry orchard that needs to be replaced with new land, all plants should be dug out and split before planting; Secondly, it is used for certain strawberry varieties that are less prone to creeping.

It's a bit unnecessary to have a dedicated breeding field, which reduces costs. The disadvantage is that the reproduction coefficient is low, and the new stem seedlings of the split plant often have separation wounds, making them susceptible to soil borne pathogens and diseases.

# ****4、 Strawberry growth environment****

Strawberries need to be grown in a sunny and warm environment. Additionally, the soil has good hydrophobicity. If you want to plant it in the ground, be careful not to use the land where potatoes have been planted before, because strawberries are prone to infection with a pathogen on potatoes.

When strawberries bear fruit, it is necessary to separate them from the soil, so planting strawberries in pots is a good choice. You can choose a multi-purpose flowerpot and lay a layer of stones on the surface of the soil in the pot, so that it is not easy to splash the soil onto the strawberries when watering. If planted in the soil, you can use some hay or a mat to protect the strawberries

Once the strawberries start to bear fruit and turn red, be careful not to let birds peck at them, as birds are more likely to spot the red things. Put a net on the strawberry or cover it with a wooden basket. But if there is a greenhouse at home, you can move the strawberries to the greenhouse, which will be better. Strawberries are also easier to bear fruit. After the strawberry fruiting period, they can be removed from the greenhouse and stored outdoors for the winter. From a certain perspective, if strawberry plants are subjected to some frost, it is more conducive to increasing yield in the following year.

Strawberries are easy to cultivate plants and can be transplanted. Sometimes you may find plants with yellow leaves, but don't worry, just remove them. In winter, you can keep the yellow leaves until new leaves grow in the following spring, then remove the dead yellow leaves and pay attention to watering, weeding, and pest control.

You can also plant strawberries in plant bags, but be sure to water them evenly to prevent birds from pecking at the strawberries and pests. The soil in the plant bag can easily dry out and needs to be checked regularly to ensure its moisture.

Strawberries are suitable for planting in soil with abundant sunlight and good hydrophobicity. The soil depth is approximately 8-10 inches.

Large strawberries should have a row spacing of 12 inches and a plant spacing of about 18 inches. It is necessary to remove the vines of the plants in a timely manner to facilitate the fruiting of strawberries. The yield of strawberries is cyclical, so it is best to cultivate some new plants in the first few years of planting.

If you don't like managing strawberries, you can plant one strawberry every 18-24 inches so that strawberries can grow everywhere. Of course, it will appear a bit messy, and the strawberries are not big either. If you want to avoid this situation, you can remove some vines appropriately.

In autumn, a layer of soil should be spread on the plants to prevent frost. After the soil freezes, 3-4 inches of hay can be spread on top of the plants. In the spring of the second year, when new leaves grow, remove the hay. After the weather warms up and stabilizes, remove the topsoil covering from the plants. But it is necessary to leave some hay between rows to prevent the growth of weeds and maintain soil moisture.

The simplest protected cultivation method is plastic film covering, and the fruit ripening period is 7-10 days earlier than ordinary open field cultivation.

By using different facilities for cultivation, strawberries can be harvested in stages, meeting the needs of different periods. Avoid centralized listing and improve economic efficiency. According to whether strawberries undergo dormancy in winter, they can be divided into facilitated cultivation and semi facilitated cultivation.

Facilitating cultivation: Strawberries do not enter dormancy but promote their continued growth and development, flowering and fruiting. When not in hibernation, keep the shed insulated to prevent hibernation, so that it can mature and be launched around New Year's Day. The shed will be closed around mid October.

Semi facilitated cultivation: Strawberries are naturally dormant and then stored in greenhouses for insulation. According to the expected market time, the greenhouses can be kept warm in a timely manner, so that the market time is between the greenhouse and the open field. The harvesting period in greenhouses is earlier than that in small greenhouses, and they can be harvested in late February.

**（1） Varieties suitable for cultivation in protected areas**

It is advisable to choose varieties with short dormancy period, easy to break dormancy artificially, low temperature tolerance, multiple flowering, strong self pollination ability, large and neat fruits with good color, high yield, and excellent flavor. The main varieties currently cultivated in greenhouses are Baojiao Zaosheng, Fengxiang, Mingbao, and Nv Feng. Regardless of which product, it is best to choose virus-free vaccines such as Lihong, Chunxiang, Gorela, Mingchang, etc

Benefits: 1. Fast growth rate and large fruit size. High sugar content. High output.

**（2） Preparation of seedlings**

The main method of seedling cultivation in production is the creeping stem splitting method, which promotes early warming of the greenhouse during cultivation, early flowering and fruiting, and requires a short period of flower bud differentiation. Therefore, it is necessary to artificially create conditions to promote flower bud differentiation and robust growth of seedlings. Through practice, transplanting and root cutting seedlings is suitable for promoting the cultivation of strawberries, with significant effects on increasing yield and income.

Transplanting root cutting seedlings includes several stages:

1. Pseudo planting: From late June to early July, the creeping stems are propagated separately in the nursery. Healthy seedlings are selected, and 3 leaves are retained. Old leaves, diseased leaves, and creeping stems are removed. Pseudo planting is carried out in the nursery at a row spacing of 15cm+15cm.

The root cutting time for transplantation is generally 20 days before the formation of flower buds. In Shandong, it is done in late August. The seedlings are cut with a shovel and moved one plant distance on site for transplantation. The planting is carried out in late September. This method can advance flower bud differentiation by about 15 days and significantly increase fruit yield.

**（3） Key points of cultivation management**

**1. Apply sufficient organic fertilizer**

Strawberries grown in greenhouses have a long fruiting period. To prevent premature leaf shedding and aging, it is necessary to reapply basal fertilizers and spray fertilizers multiple times in the middle and later stages to meet their nutritional requirements. In terms of fertilization varieties, it is necessary to master the appropriate nitrogen, phosphorus, and potassium content. Generally, 4000 kilograms of high-quality farmyard manure are applied per mu, and 50 kilograms of compound fertilizer are applied in combination. The principle of "small amount multiple times" is adopted for topdressing. From the top of the shed to the emergence of the buds, fertilizer can be applied once every 10 days and water can be poured once; About one week before flowering, watering should be stopped; After flowering, apply fertilizer and water once every 15 days. In addition, in the middle and later stages, combined with spraying, the company's 500ml calcium zinc boron potassium rapid supplement can be sprayed or the company's rare earth irrigation base material can be mixed with water for irrigation.

**2. Adopting high ridge cultivation**

Compared with flat bed cultivation, high ridge cultivation has better ventilation conditions, lower humidity around the berries, lighter fruit susceptibility, and better quality. High ridge cultivation is ridge cultivation, with two rows per ridge and ridge specifications:

Ridge spacing: 60-80 centimeters

Ridge height: 20 centimeters

Ridge top plate 30-40 centimeters

When promoting cultivation, the density should be appropriately lower, with a plant spacing of 15-20 centimeters and 8300-11000 plants per acre.

During semi cultivation, the plant spacing is 10-15 centimeters, and 12000-14000 plants are planted per acre.

If false planting is used, the number of plants planted per acre should not exceed 12000. The planting depth is: shallow without exposing the roots, deep without burying the heart, so that the base of the seedling heart is level with the soil surface. When planting, attention should also be paid to the direction of the inflorescence. The stem of the strawberry is arched, and the inflorescence grows from the back of the arch. When planting, the arch of the seedlings must be oriented towards the direction of the predetermined growth of the inflorescence and towards the edge of the ridge.

**3. Control appropriate temperature and humidity**

Shandong Province promotes the cultivation of greenhouses in mid October, and semi promotes the insulation of greenhouses from November to December. The suitable temperature for strawberry growth is 20-25 degrees Celsius. The temperature inside the greenhouse should be controlled: 25-28 degrees Celsius during the day and above 5 degrees Celsius at night. If it is below 5 degrees Celsius, it will induce plant dormancy. When the external temperature drops below 0 degrees Celsius, a small greenhouse should be added to the double arch greenhouse, with grass curtains covering the roof and plastic film covering the ground. If the temperature inside the greenhouse reaches 32 degrees Celsius or above, ventilation and cooling should be carried out, and the soil moisture should be kept at 70% -80% of the maximum water holding capacity. Both too large and too small can affect the function of roots and the normal development of fruits.

**4. Artificial light supplementation and treatment with gibberellin**

It has the effect of breaking dormancy, promoting growth and increasing fruit size, and improving yield. The method of artificial lighting is to use 100 watt incandescent lamps, one every 4 meters, turn on the lights after sunset, and turn off the lights at 10 pm at night. To save electricity, you can turn on the lights for 10 minutes every hour, and the effect is the same as continuously turning on the lights.

The mechanism of action is to shorten the length of the night, making strawberries grow as if they were under long daylight conditions.

Spray gibberellin once each during the initial stage of pruning and the budding stage, with a concentration of 5-10 milligrams per kilogram. Spray 3-5 milliliters per plant on the center of the seedlings. After treatment with gibberellin, the plants grow vigorously, the fruit stalks and petioles elongate, and the fruit is large.

**5. Releasing bees during the flowering period**

One acre greenhouse can hold 3 boxes of bees, and the release time should be advanced 5-6 days before the strawberry blooms, so that the bees can fully adapt to the environment inside the greenhouse before flowering, until March of the following year. If the occurrence of pests and diseases in the shed is severe and requires spraying or smoking, the beehive should be moved outside the shed. Bees need to be artificially fed when their flower count is low in the greenhouse.

**6. Leaf picking vegetables and fruits**

Old leaves, diseased leaves, and residual leaves produce less light and products, with high respiratory consumption, which is not conducive to the growth of strawberries and the development of berries. The creeping stem also consumes maternal nutrients. Therefore, it is necessary to remove the old leaves and creeping stems at the lower part of the plant in a timely manner to improve light and promote flower bud differentiation. Strawberries produce the best results with the first opened lower inflorescence, which can easily lead to poor fruit setting and abnormal fruit. Therefore, a certain amount of higher inflorescence flowers or fruits should be removed before and after flowering to increase large fruit and improve fruit uniformity.

# ****5、 The reason why some strawberry plants do not bloom or bear fruit****

The main reason why strawberries do not bloom or bear fruit is poor flower bud differentiation, which is influenced by internal and external factors

**（1） Internal factors:**

1. Varieties with different maturity stages have different characteristics, such as the timing of flower bud differentiation, the number of differentiated flowers, and the number of flower buds

2. Excessive nitrogen, a nutrient rich substance, is not conducive to flower bud differentiation

3. The main growth regulators are endogenous hormones such as gibberellin and auxin, which are not conducive to flower bud differentiation. Hormones that inhibit growth, such as abscisic acid and cytokinin, promote flower bud differentiation

4. Genetic material research suggests that an increase in the ratio of RNA/DNA in various fruit trees leads to a decrease in ribonuclease activity, which is beneficial for promoting flower bud differentiation

**（2） External factors**

1. Temperature, light, low temperature, and short day induced flower bud formation

2. Fertilization and watering: Excessive nitrogen fertilizer, heavy rainfall during watering, and excessive growth can delay flower bud differentiation

Artificial spraying of gibberellin as a plant growth regulator can inhibit flower bud differentiation, while plant growth retardants can promote flower bud differentiation

# ****6、 Reasons for the occurrence of abnormal strawberry fruits in greenhouses****

（1） Different varieties of strawberries will regress and age after 3-4 years, leading to an increase in malformed fruits;

（2） The most suitable temperature for the growth and development of strawberries is 20-25 degrees Celsius when the temperature is too low. The lowest temperature during the flowering and fruiting period should not be lower than 5 degrees Celsius. Lowering the temperature will affect the growth and pollination of strawberries, and it is easy to produce deformed fruits;

（3） Spraying pesticides during the flowering period can wash away the stigma and also hinder or kill pollinating insects, leading to an increase in malformed fruits;

（4） The formation of light conditions is approximately 2 weeks before self flowering. During this period, if there is insufficient light and rainy weather, it will inhibit the accumulation of starch required for pollen germination, thereby reducing pollen germination rate and hindering fertilization;

（5） Excessive or insufficient fertilizer during the flower bud differentiation period in cultivation management can affect the quality of flower bud differentiation, which is not conducive to normal pollination and can easily lead to malformed fruits;

Prevention and control measures:

1. Promote full differentiation of flower buds: Two weeks before planting, start cutting roots, shading, controlling nitrogen, and removing old leaves to promote full differentiation of flower buds;

2. Reasonably regulate temperature and humidity: the greenhouse temperature should be controlled at 20-25 degrees Celsius during the day, 8-10 degrees Celsius at night, and the humidity should be controlled at 50% -60%;

3. Ventilate during the flowering period;

4. Spraying is strictly prohibited during the flowering period;

5. Timely thinning of flowers, fruits, and vegetables;

6. Strengthen fertilizer and water management;

# ****7、 How to prevent and treat pistil degeneration****

**（1） Symptoms:**

The stigma is extremely small and underdeveloped, and the pistil degenerates until it turns black and dies, unable to complete the pollination process and bearing no fruit. The stamens are normal.

**（2） Cause of onset:**

1. Boron deficiency;

2. Measures taken in production to shorten the dormancy period, such as increasing light exposure time and intensity, high-temperature treatment, and spraying gibberellin, have led to pistil degeneration;

**（3） Prevention and control measures:**

1. Apply high-quality organic fertilizers that have been fully decomposed, and avoid excessive use of chemical fertilizers, especially when applying potassium fertilizers.

2. Supplement boron fertilizer, apply 2-2.5 kilograms of borax per mu as base fertilizer, and compost together with organic fertilizer.

3. Strictly control soil moisture and do not exceed 80% of the maximum water holding capacity in the field for a long time.

4. Try applying appropriate amounts of gibberellin and maintaining a suitable temperature. The best treatment effect is achieved with a concentration of about 5 milligrams per kilogram of gibberellin. Require a temperature of 22-25 degrees Celsius during the day and 13-15 degrees Celsius at night.

5. In general, the phenomenon of dormancy only occurs in low-temperature sunset. If insulation and heating measures are strengthened to keep the temperature above 7.2 degrees, dormancy will not occur or only for a short period of time.

# 8、 Nutrient deficiency syndrome and prevention and treatment methods

**（1） Nitrogen deficiency syndrome**

1. Symptoms: Generally, when nitrogen deficiency begins, especially during the peak growth period, the leaves gradually change from green to light green. As nitrogen deficiency worsens, the leaves turn yellow, locally withered and slightly smaller than normal leaves. As the degree of nitrogen deficiency increases, the young leaves become greener. The petiole and calyx of the old leaves are slightly red in color, with lighter or serrated bright red leaves. Poor soil without proper fertilization, extensive management, and overgrown weeds are prone to nitrogen deficiency.

2. Prevention and control methods: Adequate basal fertilizer should be applied to meet the short and concentrated growth characteristics of the spring growth period. If nitrogen deficiency is found, apply 11.5 kilograms of ammonium nitrate or 8.5 kilograms of urea per acre, and immediately irrigate after application. During the flowering period, foliar fertilizer can be sprayed 1-2 times with a 0.3% -0.5% urea solution, and 50 kilograms of fertilizer solution or 0.2% potassium dihydrogen phosphate solution can be sprayed 2-3 times per acre.

**（2） Phosphorus deficiency syndrome**

1. Symptoms: Weak plant growth, slow development, and bronze dark green color on leaves. When phosphorus deficiency worsens, the appearance of the upper leaves shows purple red spots, which are also present in older leaves. The flowers and fruits on phosphorus deficient plants are smaller than those on normal plants. Soil with high calcium content or acidity, as well as loose sandy soil or soil with abundant organic matter, are prone to phosphorus deficiency.

2. Prevention and control methods: When the plant begins to show symptoms, 1% superphosphate clear solution or 0.1% -0.2% potassium dihydrogen phosphate solution should be sprayed on the leaves 2-3 times, every 7-10 days, with 50 kilograms of fertilizer sprayed per acre.

**（3） Potassium deficiency syndrome**

1. Symptoms: The symptom of potassium deficiency in strawberries often occurs in the newly ripe upper leaves. The edges of the leaves often appear black, brown, and dry, which can lead to burns. They also develop towards the center between the veins of most leaves, and old leaves are severely damaged. Light exposure exacerbates leaf burns, so potassium deficiency is often confused with "sunburn". The burnt leaves and true petioles often develop into brown to dark brown, with mild damage, and gradually wither. Potassium deficient strawberries have light fruit color and poor taste.

2. Prevention and control methods: Apply sufficient organic fertilizers and apply about 7.5 kilograms of potassium sulfate per acre; You can also spray 0.1% -0.2% potassium dihydrogen phosphate solution on the leaves 2-3 times, once every 7-10 days, with 50 kilograms of fertilizer solution sprayed per acre each time.

**（4） Boron deficiency syndrome**

1. Symptoms: Early boron deficiency, wrinkling and charring of young leaves, yellow edges of leaves, and damage to growth points. As boron deficiency worsens, the veins of old leaves may lose their green color or the leaves may curl upwards. Boron deficient plants have small flowers, low pollination and fruiting rates, malformed or nodular fruits, small fruits with many seeds, and poor fruit quality. Boron deficient soil and soil drought are prone to boron deficiency.

2. Prevention and control methods: timely watering to increase the content of soluble boron in the soil, in order to facilitate plant absorption. Strawberries with boron deficiency can be sprayed with 0.15% borax solution on the leaves 2-3 times. During the flowering period, boron should be supplemented and the spraying concentration should be appropriately reduced. Each time, 50 kilograms of fertilizer solution should be sprayed per mu, and 500ml of amino boron zinc calcium potassium treasure or 500ml of rare earth boron zinc calcium potassium treasure should be sprayed on the leaves.

**（5） Iron deficiency syndrome**

1. Symptoms: Young leaves turn yellow or lose green, and become white as the degree of yellowing worsens. When there is moderate iron deficiency, the leaf veins are green and the intervein veins are yellow white. When there is severe iron deficiency, newly grown small leaves turn white, leaf margins become necrotic, or small leaves turn yellow. Alkaline soils or soils with strong acidity are prone to iron deficiency.

2. Prevention and control methods: Adjust the soil pH to 6-6.5, and spray 0.2% -0.5% ferrous sulfate solution on the leaves 2-3 times.

**（6） Zinc deficiency syndrome**

1. Symptoms: When zinc deficiency worsens, the old leaves become narrower. Especially, the heavier the zinc deficiency in the base leaves, the more elongated the narrow leaf parts. But zinc deficiency does not cause necrosis. When there is severe zinc deficiency, new leaves turn yellow, leaf veins become slightly red, and the edges of the leaves have obvious serrated edges. Zinc deficient plants yield fewer results.

2. Prevention and control methods: Apply more organic fertilizer, improve the soil, and spray 0.05% -0.1% zinc sulfate solution on the leaves 2-3 times. The spraying concentration should not be too high to avoid drug damage.

# ****9、 Prevention and control of pests and diseases****

**（1） Disease prevention and control**

**1. Powdery mildew**

Powdery mildew harms parts such as leaves, petioles, fruits, and fruit stalks. The main characteristics of this disease are the appearance of a white powdery substance at the affected site, early damage to the fruit, and cessation of young fruit development; In the later stage, the fruit was damaged and covered with a layer of white powder, which seriously affected the quality of the berries.

Prevention and control methods:

① Select disease resistant varieties, cultivate visible seedlings, and strengthen soil, fertilizer, and water management to prevent weakened growth;

② Avoid excessive humidity and abnormal dryness, pay attention to ventilation and air exchange;

③ Timely burn or deeply bury diseased plants;

④ 20ml of pure water is mixed with 15-30kg of spray to re spray the affected part.

**2. Gray mold**

Gray mold mainly harms fruits, and can infect petals, sepals, stems, leaves, and petioles. In the early stages of the disease, a light brown water like lesion first forms at the base of the fruit, then expands to a brown edge and a dark brown central lesion, with obvious oily and toxic lesions around the lesion. Finally, the entire fruit rots. The surface of the affected area is covered with a dense layer of gray mold.

Prevention and control methods:

1. Prevent and control excessive humidity, high nitrogen, overcrowding, and overgrowth, and maintain good ventilation;

② Cover with plastic film to avoid contact between fruits and soil;

③ High ridge planting should be used for protected cultivation, preferably drip irrigation. When flooding, remember to soak the fruits in water;

④ Each set of ash cleaning shall be sprayed with 15-30 kg water spray to re spray the affected part.

⑤ Spray fungicide before flowering, starting from the emergence of buds, every seven days for 2-3 consecutive sprays. 10% Oxytetracycline 1000x solution, 25% Decamycin 500x solution.

**3. Viral disease**

Virus diseases have the characteristic of latent infection, and plants cannot quickly show symptoms; Viral diseases are mainly transmitted through aphids and leafhoppers, and can also be infected through grafting.

Prevention and control methods:

① Cultivate and plant virus-free seedlings;

② Timely prevention and control of aphids and leafhoppers to reduce virus reinfection;

③ Adopting disease resistant varieties;

④ Timely remove diseased plant residues and weeds from the field;

⑤ Spraying medication for prevention and control;

**4. Anthrax disease**

This disease occurs during the creeping and seedling stages, and rarely occurs during the growth and fruiting stage. The main harm is that creeping stems, petioles, leaves, bracts, flowers, and fruits can also be infected. In the early stages of the disease, the lesions appear watery, and in the later stages, the lesions become black.

Prevention and treatment methods: It is difficult to prevent and treat this disease with medication, and prevention is the main measure.

① Choose disease resistant varieties

② Avoid continuous cropping of nursery land for many years

③ Implement crop rotation as much as possible, pay attention to clearing the garden, and promptly remove diseased and disabled individuals

④ The medicine can be sprayed 3-5 times with a 600 fold dilution of Baijunqing or twice with 0.4% Bordeaux mixture. The best spraying period is before the creeping stem is pulled.

In the prevention and control of anthrax, it is necessary to spray pesticides before and after the rain to prevent and control it. We must not be careless, but at the same time, we must pay attention to the harm of the larvae. In late July, the outbreak stage of the larvae begins. All strawberry seedlings should be immediately irrigated for prevention and control, which can reduce unnecessary losses. Use 40.7% toxic beer 150-200 ml of diluted water per acre, diluted 1500 times with water, so that the medicine can flow into the strawberry seedlings. The residual effect period can reach 50 days.

**（2） Pest control**

**1. Red Spider**

The larvae and adults of the red spider feed on the juice on the back of strawberry leaves, causing small grayish white dots to form locally on the leaves, which gradually expand and form mottled patterns. When the harm is severe, the leaves become rusty and dry, resembling a burning fire. Causing serious production cuts.

Red spider and yellow spider are the main victims of strawberry damage. Especially red spider mites cause more damage, with small gray white spots appearing on the leaves during the initial stage of damage, gradually expanding, causing the entire leaf to be covered with broken white patterns, yellowing and curling, and the plant to become dwarf and shrink, seriously affecting growth.

Disease incidence pattern: High temperature and dryness are favorable conditions for inducing a large proliferation of red spider mites. The adult red spider has no wings and spreads through wind, rain, transportation of seedlings, as well as through human bodies, tools, and other means.

Prevention and control methods:

① During the seedling cultivation period, pay attention to timely watering to avoid drought;

② Timely removal of diseased and withered leaves to reduce the spread of insect sources;

③ Spraying sulfur suspension agent;

④ Spray 1.8% avermectin emulsion at a concentration of 3000-4000 times. When the flower clusters first appear, spray 0.3 degree stone sulfur mixture and spray again every seven days. Before harvesting, use a 20% potency solution with low residual toxicity to kill 5000 to 8000 times the amount of pyrethroids, spray twice with a five-day interval. Please note that pesticides are prohibited two weeks before fruit harvesting.

**2. Aphids**

It occurs throughout the year in strawberry plants, with the highest density in early summer and early autumn. It is mostly active on the petiole and back of young leaves to suck sap, and honeydew contaminates the leaves. Ants feed on its honeydew, so when there are many ants near the plant, it indicates that aphids have begun to harm. Aphids can cause leaves to curl, twist, and deform. More seriously, aphids are carriers of the virus. The harm caused by its transmission is greater than the losses caused by its own harm. Aphids are harmful to strawberries because they absorb sap, which hinders fruit growth, and also contaminate leaves and fruits due to aphid discharge of nectar. In addition, aphids are also vectors for spreading viruses.

Disease prevention rules: Aphids occur 10-20 generations per year in Hebei and Beijing areas, and complete one generation every seven days under temperature conditions of around 25 degrees Celsius, with severe generation overlap. Aphids overwinter as adults under plastic film covered strawberry stems and old leaves.

Prevention and control methods:

① Timely remove old leaves, clean the field, and eliminate weeds. Timely remove old leaves, clean the field, and eliminate weeds. Spray 50% aphid repellent mist 2000 times before flowering, spraying 1-2 times in total;

② 22% of dichlorvos smoke hood;

③ Before the flowering period, spraying pesticides 1-2 times can be used for prevention and control. Aphid killing tobacco agents can be used, or 20% imidacloprid can be sprayed 4000-5000 times in liquid. 50% aphid repellent mist or 50% anti aphid wettable powder can be sprayed 1-2 times in 2000 times in liquid.

**3. White whitefly**

Whiteflies are important pests that harm strawberries in North China. Their adults and nymphs cluster on the back of leaves, sucking sap and hindering leaf growth, resulting in yellowing. Adults and nymphs can also secrete a large amount of honeydew, which accumulates on the leaves and fruits, often causing mold stains.

Disease incidence pattern; In Beijing and Hebei, more than 10 generations can occur in a year, and the population density increases the fastest in July and August.

Prevention and control methods:

① Reduce the number of overwintering insect eggs and remove weeds and fallen leaves before planting;

② Set up a yellow board, apply engine oil on the board to attract and kill aphids and whiteflies, or set up insect nets at the air outlet to block them, or hang silver gray plastic film strips to drive away aphids;

③ Release aphids and wasps to effectively control whiteflies;

④ Can be fumigated with fumigants such as Chlorpyrifos and Dichlorvos;

⑤ Medication spray treatment: Aphids can be treated by spraying 50% aphid repellent mist or 50% anti aphid wettable powder at a dilution of 2000 times 1-2 times.

# ****10、 Timely picking****

Strawberries in protected areas are mainly used for fresh consumption and should be harvested only when the fruit is fully colored. However, strawberry berries are soft and not resistant to transportation, so they are harvested when they are ripe from 8-9 in the morning or from 16-18 in the afternoon. During this period, the fruit has no dew and the temperature is not high, which is conducive to the preservation and transportation of the berries. When picking, they should be handled gently without damaging the sepals. After harvesting, they should be stored in delicate small packaging boxes to increase the value of the product and obtain higher benefits.

# 11、 Strawberry outdoor planting technology

Strawberries planted in the open field are a common cultivation method with a short cycle, easy management, low investment, low cost, and minimal labor. The previous crop is mostly early maturing crops such as vegetables and wheat, and can also be intercropped in young orchards.

**（1） Garden selection and land preparation**

Strawberries have a strong adaptability to soil and can generally be grown on land. However, strawberries have the characteristics of liking light, water, fertilizer, and being afraid of waterlogging. Therefore, the orchard is often planted in loam or sandy loam soil with high terrain, flat ground, loose soil, convenient drainage and irrigation, good lighting, and abundant organic matter. Strawberries prefer neutral or slightly acidic soil, with a suitable pH range of 5.5-7.0. The previous crop should be legumes, melons, and wheat, and rotation with tomato, eggplant, green pepper, potato and other eggplant crops should be avoided as much as possible. 7、 Thoroughly remove weeds, carefully prepare the soil, apply sufficient base fertilizer, and improve soil fertility before planting in August to meet the nutrient requirements for the entire growth cycle. Generally, more than 5 cubic meters of decomposed chicken manure, 50 kilograms of superphosphate, and 30 kilograms of compound fertilizer are applied per mu. After evenly spreading the bottom fertilizer, the soil is deeply plowed for 20-25 centimeters, raked flat and covered. Before plowing, 2 kilograms of phoxim are used per mu for soil disinfection treatment. After processing, prepare the land and make beds. The construction of beds must be meticulous, otherwise it will seriously affect the survival rate of seedlings and the growth of seedlings after planting. Ensure that the bed surface and ridge are straight, the soil is fine and flat, and 2-3 days before planting seedlings, water the ground and compact the soil.

Strawberries are cultivated in open fields in two ways: flat bed and high bed. The width of the flat bed is 1.3-1.5 meters; The width of the high bed is 0.8-1.0 meters, the width of the bed surface is 0.40-0.50 meters, the width of the bed ditch is 0.40-0.50 meters, and the height of the bed is 0.15-0.20 meters. The bed should not be too long, usually 30-50 meters, to avoid irrigation difficulties.

**（2） Seedling planting**

1. Planting period: early August to early to mid September. China has a vast territory, and the planting time varies in different regions. Early planting is recommended in northern regions, while in Baoding region, it is advisable to plant from mid August to mid September.

2. Planting density: 7000-10000 seedlings per mu. Flat bed: Plant 4 rows per bed, with a row spacing of 0.30-0.35 meters and a plant spacing of 0.20-0.30 meters; High bed: Plant 2 rows per bed, with a row spacing of 0.25-0.30 meters and a plant spacing of 0.15-0.25 meters.

3. Planting method: Planting should be done on cloudy days or after four or five o'clock in the afternoon to avoid direct sunlight exposure. Seedlings should be planted with 3-5 leaves, at least 10 new roots, and full top buds that are disease-free and strong. The depth of planting is the key to the survival of seedlings. Planting too deep or too shallow can cause seedling death. The correct method is to level the root neck of the seedlings with the ground, arch the back outward to achieve a depth without burying the center, shallow without exposing the roots, and allow the root system to fully extend. After planting, press the soil firmly, immediately water it thoroughly, and continue watering for 3-4 days. After watering, check in a timely manner and replant the silt filled seedlings, exposed seedlings, and crooked seedlings as required. After planting, it is best to use reed curtains or leafy branches for shade in case of sunny days and scorching sun.

**（3） Management after planting**

Strawberries have a short growth cycle and high yield. In addition, they prefer fertilizer and water, so it is necessary to strengthen various management work centered on soil, fertilizer, and water.

1. Pre winter management: After the strawberry plants are successfully planted, shallow tillage and weeding should be carried out in a timely manner. Sick leaves, old leaves, and creeping stems should be removed in a timely manner and destroyed in a centralized manner. When there are two new unfolded leaves, 10-15 kilograms of N, P, K compound fertilizer should be applied per mu, and the same amount of fertilizer should be applied again from late September to early October. If the seedlings are planted late, two fertilizers can be applied together as one application, and the amount can be reduced accordingly. It is best to apply two new leaves at the stage of unfolding. In addition to watering thoroughly after fertilization, attention should also be paid to watering and maintaining soil moisture in daily life.

Cover to prevent cold, so that strawberry seedlings can overwinter with greenery and maintain soil moisture. Before winter, it is necessary to cover with plastic film, which is also a yield increasing technique. The coverage period in Baoding area is in late November. Before covering, water once with frozen water and apply 20 kilograms of compound fertilizer per mu to facilitate spring germination. When the surface is slightly dry, cover with 0.008-0.015mm thick polyethylene film, and cover the seedlings according to the width and length of the bed. The film should be tightened, leveled, and tightly adhered to the bed surface. The surrounding area of the film should be tightly compacted with soil.

2. Spring management: Remove the plastic film when the early spring seedlings begin to sprout. In mid to late March, in Baoding area, break the film and lift the seedlings. Align the film with the seedlings under the film, open a small hole in the film, and do not make it too large. Then use your fingers to close the leaves under the film to the film, and expose the bud center. Leave the film in place, press it tightly, continue to cover, and lift off dry and old leaves.

(1) Fertilization and watering: After breaking the film and lifting the seedlings, the soil is generally moist, so do not rush to water. The first watering in spring can be postponed to the bud stage, but attention should also be paid to the early spring breeze and dry climate. Check the soil moisture at any time. When the surface is dry, watering should be done in a timely manner.

From the budding stage to the early flowering stage, more water is needed and sufficient watering should be done. If there is drought during the fruit harvesting period, watering should be done in the evening, at night, or the next morning after harvesting. But it is necessary to pour small amounts of water to prevent the fruits from being soaked and rotting. If conditions permit, it is best to use drip irrigation for better results.

During the budding stage, watering should be combined with applying 10-15 kilograms of potassium sulfate compound fertilizer per acre. During the fruit swelling stage, another 10-15 kilograms of potassium sulfate compound fertilizer should be applied. From the flowering stage to the fruiting stage, 0.3% potassium dihydrogen phosphate should be sprayed 3-4 times to increase fruit setting rate and improve fruit quality.

(2) Other management: During the early spring to fruit harvesting period, plant management should be strengthened by removing old and diseased leaves, removing creeping stems, and removing flowers in the later stages of the inflorescence to reduce nutrient consumption and improve fruit yield and quality.

(3) Harvesting: Strawberries are mostly harvested in the open field during May and June, when the temperature is high and the weather is hot. In order to maintain the freshness of the fruit, harvesting should be carried out in the cooler mornings or evenings. This can improve the freshness and integrity of fresh strawberries.

# 12、 Cultivation Techniques for Strawberries in Greenhouses

Strawberries are rich in nutrients, easy to cultivate and manage in greenhouses, with low production costs, high yields, and good profits.

**1、 Variety selection**

Choose large fruit varieties with shallow dormancy period, such as Fengxiang, Mingbao, Chunxiang, Jiuneng, Shuofeng, Xindu No.1 and No.2, Xinmingxing, etc.

**2、 Cultivate strong seedlings**

In early to mid August, select robust seedlings that have grown on the creeping stems of strawberries and transplant them to open seedbeds or plastic pots for seedling cultivation. The soil in the seedbeds or pots should have good water retention and breathability. Strawberries should be covered with shading nets to cool down after transplantation. After the strawberries are live, it is advisable to control the fertilizer and water appropriately. By September, the shading net should be removed in a timely manner to prevent excessive growth.

**3、 Land preparation and planting**

Before planting, plow and plow the soil inside the greenhouse. At the same time, apply mature manure per mu, 3000~4000kg of manure and 50-60kg of compound fertilizer as the base, and then make beds with a width of 1 meter (including ditch). A standard greenhouse with a width of 6 meters can make 6 beds with a ditch depth of 25-30cm. Planting in mid to late September. Before planting, lay plastic film on the surface of the bed and drill holes on the film for planting. Plant 2 rows per bed, with a row spacing of 25cm × 20cm, and about 7000 plants per acre. When planting, the inflorescence should face the ditch, and the planting depth should be based on the root neck being level with the soil surface. The seedling center should not be buried in the soil.

**4、 Field management**

1. Temperature control

Starting from mid October, film insulation will be applied. Adopting double membrane coverage, during the initial planting period, it is required to maintain a temperature of 25-30 ℃ during the day and not lower than 12 ℃ at night. During the fruiting period, the temperature should be 20-23 ℃ during the day and not lower than 5 ℃ at night. Generally, the temperature should be controlled between 25-28 ℃ during the day, not exceeding 30 ℃, and 7 ℃ is recommended at night. Maintain a temperature of 25 degrees during the initial flowering period and control it at 23 degrees during the flowering period. Between the second half of December and the end of January, when the greenhouse temperature is below 5 degrees, a small arch canopy with double interlocking film should be installed inside the greenhouse. In extreme low temperatures, three-layer film insulation should be used. The humidity inside the greenhouse should be controlled below 80% before flowering, and 60% from flowering to fruit enlargement is recommended. To prevent diseases caused by high temperature and high humidity, spray 800 times the emulsion of "New High Fat Film" every 10 days, for a total of 2 times. By April of the following year, if the temperature significantly rises, the protective film on both sides of the greenhouse can be removed, the ventilation volume can be increased, which can cool down and reduce humidity, and prolong the production period of the fruit.

2. Moisture control. The relative humidity is maintained at around 50%.

3. Watering. Fruit swelling period. Strawberries require more water, and drip irrigation can be used to keep the soil layer above 7-8cm moist. Timely supplement phosphorus, potassium fertilizer, and multiple trace elements according to the growth of strawberries. Throughout the entire growth process, there should be sufficient water. The soil moisture during the flowering period can be slightly dry, while during the vigorous growth period and berry swelling period, more water is needed. Irrigation can be combined with fertilization, and the fertilizer can be dissolved in water to form a solution that is about 1000 times stronger for application. After the spring of the second year, as the temperature rises and the production speed accelerates, in order to avoid strawberry fruit acidification, potassium fertilizer should be applied more, with about 5 kilograms of 0.3% potassium sulfate per mu. In addition, spray "Guaguo Zhuangtiling"+0.3% -0.5% urea and 0.3% potassium dihydrogen phosphate solution before flowering, during the young fruit stage, and during the fruit swelling stage. Apply 0.1-0.2 kg of urea per plant to supplement the nutrients required for fruit growth and improve the quality of grain filling.

4. Topdressing. Master the principle of frequent application of thin fertilizer. After planting live plants, apply 0.5% compound fertilizer solution, and after harvesting for about 20 days, apply topdressing again. Depending on the specific situation, use 0.2% potassium dihydrogen phosphate and 0.4% urea solution for root topdressing.

5. Plant adjustment. During the growth period of strawberries, it is necessary to promptly remove creeping stems, old leaves, diseased leaves, and residual sepals after fruit harvesting; Select 2-3 robust tillers for each strawberry plant and promptly remove the remaining tillers; Remove low-level flowers.

6. Artificial pollination. During the flowering period of strawberries, applying a brush to the flowers at 8-9 am every day can significantly increase yield and yield. It's best to keep bees in the shed. Complete pollination.

7. Prevent and control pests and diseases. In low temperature and rainy weather, strawberries are prone to gray mold. It can be controlled by 1000~1500 times liquid spray of 50% Sukeling wettable powder; For powdery mildew, 20% Fen Xi Ning emulsion at 3000-4000 times dilution can be used for prevention and control. In addition, attention should be paid to timely prevention and control of aphids.

8. Spray hormones. Spraying 10 × 10-6 gibberellin solution on the first heart leaf of strawberries during growth and flowering not only significantly increases yield, but also improves fruit quality.

9. Supplement the light. In the cold winter season, setting up a 60 watt light bulb every 1.5 meters in the small shed for heating and lighting can maintain the lowest temperature in the shed at around 5 ℃ and advance the harvesting period by about 20 days.

**5、 Disease and pest control**

The main pests and diseases include aphids, leaf mites, gray mold, powdery mildew, and blast disease. It can increase the efficacy of killing aphids and spider mites by 20% and kill pyrethroids by 1500 times with 40% dimethoate. Gray mold is most likely to occur during high temperature and high humidity, as well as during the vigorous growth period of strawberries. It can be controlled with 50% Sukendazim at a rate of 800 times, and the effect is very good. For blast disease, remove old leaves, ventilate and let light pass through, and spray 1000 times the amount of polyoxytoxin or 600 times the amount of Diclofenan solution every week.

Greenhouse strawberries are sold early and generate significant profits. Therefore, it is necessary to strengthen the management techniques of greenhouse strawberries to achieve early harvest and benefits.

# 13、 Planting Method of Potted Strawberries (1) Selection of Pot, Soil, and Variety

It is advisable to choose ceramic pots with a diameter of 20-30 centimeters for potted plants. Selection of potting soil[humus](http://zhidao.baidu.com/search?word=%E8%85%90%E6%AE%96%E8%B4%A8&fr=qb_search_exp&ie=utf8)Soil with high content. Variety adopted from Europe[Four Seasons Red](http://zhidao.baidu.com/search?word=%E5%9B%9B%E5%AD%A3%E7%BA%A2&fr=qb_search_exp&ie=utf8)It is better to potted excellent four season strawberry varieties such as Changhong 2 and 83-38. It can bloom and bear fruit multiple times throughout the year.

(2) Cultivation techniques

Potting can be done all year round. But it is best to plant the seedlings from the garden in autumn. Choose robust[When picking up seedlings, it is important to bring more soil and remove old and residual leaves](http://zhidao.baidu.com/search?word=%E7%A7%A7%E8%8B%97&fr=qb_search_exp&ie=utf8)[a seedling](http://zhidao.baidu.com/search?word=%E8%8B%97%E6%9C%A8&fr=qb_search_exp&ie=utf8)[Cut the root system by about 10 centimeters. letroot system](http://zhidao.baidu.com/search?word=%E6%A0%B9%E7%B3%BB&fr=qb_search_exp&ie=utf8)Stretch and plant into the soil. The planting depth should be based on the principle of not exposing roots or burying the heart. The soil should be compacted, the seedling position should be fixed, and the soil surface should be kept 3-4 centimeters away from the pot mouth. After planting, water thoroughly and place in a cool place for 3-5 days, then move to a well lit area.

(3) Fertilizer and water management

Four season strawberries bloom and bear fruit multiple times a year, consuming a lot of nutrients. It is necessary to strengthen nutrient supplementation. Usable animal hooves[Fish bones](http://zhidao.baidu.com/search?word=%E9%B1%BC%E9%AA%A8&fr=qb_search_exp&ie=utf8)Poultry organs[Bean cake](http://zhidao.baidu.com/search?word=%E8%B1%86%E9%A5%BC&fr=qb_search_exp&ie=utf8)Wait, add water[Rotten and matured](http://zhidao.baidu.com/search?word=%E8%85%90%E7%86%9F&fr=qb_search_exp&ie=utf8)Fermentation, fermentation to make liquid fertilizer water or topdressing[Compound fertilizer](http://zhidao.baidu.com/search?word=%E5%A4%8D%E5%90%88%E8%82%A5&fr=qb_search_exp&ie=utf8)Usually, apply fertilizer once a week. Outdoor potted plants, water once in the morning and once in the evening every day. When watering, the water should be warmed up in advance before use, and direct use should be avoided[Well water](http://zhidao.baidu.com/search?word=%E4%BA%95%E6%B0%B4&fr=qb_search_exp&ie=utf8)Or irrigate with tap water.

（4）[Nursery management](http://zhidao.baidu.com/search?word=%E8%8B%97%E6%9C%A8&fr=qb_search_exp&ie=utf8)

Potted strawberries should strengthen plant management. Firstly, timely thinning of buds, leaf picking, and removal[Crawling stem. The high-level flower that is about to become invalid, in](http://zhidao.baidu.com/search?word=%E5%8C%8D%E5%8C%90%E8%8C%8E&fr=qb_search_exp&ie=utf8)[Bud](http://zhidao.baidu.com/search?word=%E8%8A%B1%E8%95%BE&fr=qb_search_exp&ie=utf8)Moderate dispersion during the dispersal period. Remove old leaves, residual leaves, diseased leaves, and excess[Creeping stem](http://zhidao.baidu.com/search?word=%E5%8C%8D%E5%8C%90%E8%8C%8E&fr=qb_search_exp&ie=utf8)To reduce nutrient consumption and improve fruit quality. The second is fruit shaping. Use iron wire or bamboo sticks to make fruit racks of different shapes, and put them in[Flower pot](http://zhidao.baidu.com/search?word=%E8%8A%B1%E7%9B%86&fr=qb_search_exp&ie=utf8)take[Ear of fruit](http://zhidao.baidu.com/search?word=%E6%9E%9C%E7%A9%97&fr=qb_search_exp&ie=utf8)Set up, promote[Ear of fruit](http://zhidao.baidu.com/search?word=%E6%9E%9C%E7%A9%97&fr=qb_search_exp&ie=utf8)Ventilation and transparency, uniform fruit coloring, prevention of soil contamination of fruits, and reduction of pest and disease hazards. Meanwhile, it can also be utilized[Creeping stem](http://zhidao.baidu.com/search?word=%E5%8C%8D%E5%8C%90%E8%8C%8E&fr=qb_search_exp&ie=utf8)Performing artistic modeling to enhance aesthetic value. Thirdly, corresponding comprehensive prevention and control measures should be adopted to prevent and control diseases and pests.

(5) Change basin

After 2 years of fruiting in potted strawberries, the pot or soil should be changed after fruiting. When changing pots, first remove the plants from the pot, cut off aging roots, dead roots, and lower aging roots[rhizome](http://zhidao.baidu.com/search?word=%E6%A0%B9%E8%8C%8E&fr=qb_search_exp&ie=utf8)Then plant it in a new pot of soil.

(6) Temperature and humidity

Generally, potted strawberries require a temperature of 20-25 ℃, and the room temperature should be maintained above 15 ℃ in winter.[Flower pot](http://zhidao.baidu.com/search?word=%E8%8A%B1%E7%9B%86&fr=qb_search_exp&ie=utf8)It should be placed in a well ventilated and sunny area, and the soil should be kept moist regularly.

Choose strong seeds, mix plant ash or fine soil with the seeds, spread them on the surface of the potting soil, and then cover it with a thin layer of fine soil. Then pour enough water. Pay attention to watering gently and do not rush out the seeds. Cover the basin with a piece of glass or wet newspaper, mainly for insulation Moisturizing effect. Placed in a sunny place, it will sprout and grow in about 20 days. We need to prevent freezing in winter. Apply compound fertilizer after the new leaves emerge in the spring of the following year. Strawberries bloom and bear fruit in their first year of growth, but the yield is not high. The second year is a prosperous year of flowering and fruiting. By the third year, the output had decreased again. It is best to cultivate new plants to replace old ones. It is best not to let it bloom and bear fruit in the first year of growth, but to let it have more leaves, which is beneficial for the abundant production in the second year. As an ornamental, it's also good to let it bear fruit in the first year. This requires applying more phosphorus fertilizer in the early spring. Phosphate fertilizer is beneficial for flowering and fruiting.

Strawberries prefer warmth and ample sunlight, so try not to let the fertilizer or water get on the leaves when watering. Strawberries are a crop with easy growth and reproduction, short cycle, early maturity, fast fruiting, and high economic benefits. Effective annual management is essential for achieving high and stable strawberry yields.

**1、 Pre winter management**

After strawberry planting, the following three management measures should be taken:

① Thin fertilizer application: Spraying new high fat film on slender plants has the effect of shortening the seedling stage, quickly adapting to new environments, and promoting healthy growth. The amount of fertilizer applied during the seedling stage should be reduced to promote root growth and increase the number of flowers in the inflorescence.

② Keep moist: In addition to double covering with greenhouses and small arch sheds for insulation, foliar covering and other insulation measures can also be used.

③ Weed and loosen the soil, remove diseased leaves.

**2、 Management before and after flowering**

1. Strawberries need to be sprayed with a new high fat film during the flowering and fruiting period, which has the functions of anti freezing, anti cold, and flower and fruit preservation. Spraying Caiguo Zhuangdiling during the early flowering stage, young fruit stage, and fruit enlargement stage can enhance the quality of pollen fertilization and improve the cyclic fruit setting rate.

2. Strawberries are tender and have a long flowering period, so it is important to emphasize the use of comprehensive pest and disease control measures. During the flowering and fruiting stages as well as the fruit development stage, no pesticides are used for prevention and control. 3、 Winter management: Strawberries are perennial herbaceous plants, and the key period for their high-yield management is in winter. The key to winter management is to focus on the "three defenses", namely preventing cold, drought, and premature flowering. Before the arrival of winter, it is necessary to water thoroughly to prevent the cold.

Strawberry is the fruit of the Rosaceae plant strawberry, a perennial herbaceous plant with white flowers. Harvested from June to July each year when the fruit is ripe, and used fresh. The cultivation of strawberries has a three-year cycle. In the first year, only a small amount of strawberries can be harvested, but in the second year, a lot can be harvested. However, in the third year or beyond, the yield of strawberries will significantly decrease and the plants need to be replaced. So arranging the cultivation of new plants reasonably and ensuring that there are always some strawberries born in the second year every year can achieve maximum economic benefits. When strawberries grow well, they will produce a vine and new small plants will grow at the end of the vine. When the small plant grows to 3-4 leaves, it can be cut off and planted in another pot, paying attention to watering. It's best not to let the new plants born in the first year produce strawberries, only let them grow more leaves. So when a new strawberry blooms in a year, the flowers should be picked off. When watering, be careful not to wet the strawberries, as once they are splashed with water, they are prone to decay. Strawberries are easy to cultivate plants and can be transplanted. Sometimes you may find plants with yellow leaves, but don't worry, just remove them. In winter, you can keep the yellow leaves until new leaves grow in the following spring, then remove the dead yellow leaves and pay attention to watering, weeding, and pest control.

1. Strawberries are suitable for planting in soil with abundant sunlight and good hydrophobicity. Soil depth is 8-10 inches. 2. Large strawberries should have a row spacing of 12 inches and a plant spacing of about 18 inches. It is necessary to remove the vines of the plants in a timely manner to facilitate the fruiting of strawberries. The yield of strawberries is cyclical, so it is best to cultivate some new plants in the first few years of planting. 3. If you don't like managing strawberries, you can plant one strawberry every 18-24 inches so that strawberries can grow everywhere. Of course, it will appear a bit messy, and the strawberries are not big either. If you want to avoid this situation, you can remove some vines appropriately. 4. In autumn, a layer of soil should be spread on the plants to prevent frost. After the soil freezes, 3-4 inches of hay can be spread on top of the plants. In the spring of the second year, when new leaves grow, remove the hay. After the weather warms up and stabilizes, remove the topsoil covering from the plants. But it is necessary to leave some hay between rows to prevent the growth of weeds and maintain soil moisture.

Planting method

1、 Choose pots, soil, and varieties. It is advisable to choose ceramic pots with a diameter of 20-30 centimeters for potted plants. Selection of potting soil[humus](http://baike.baidu.com/view/62840.htm)Soil with high content. Variety adopted from Europe[Four Seasons Red](http://baike.baidu.com/view/38382.htm)It is better to potted excellent four season strawberry varieties such as Changhong 2 and 83-38. It can bloom and bear fruit multiple times throughout the year.

2、 Cultivation techniques.[Potted plant](http://baike.baidu.com/view/2413013.htm)Time is available all year round. But it is best to plant the seedlings from the garden in autumn. Choose strong seedlings, bring more soil when picking them up, remove old leaves, and remove the seedlings[root system](http://baike.baidu.com/view/138415.htm)Cut around 10 centimeters. Let the roots stretch and plant into the soil. The planting depth should be based on the principle of not exposing roots or burying the heart. The soil should be compacted, the seedling position should be fixed, and the soil surface should be kept 3-4 centimeters away from the pot mouth. After planting, water thoroughly and place in a cool place for 3-5 days, then move to a well lit area.

3、 Fertilizer and water management. Four season strawberries bloom and bear fruit multiple times a year, consuming a lot of nutrients. It is necessary to strengthen nutrient supplementation. Usable animal hooves, fish bones, poultry organs[Bean cake](http://baike.baidu.com/view/329441.htm)Wait, add water to ferment and ferment, then ferment to make liquid fertilizer water or apply compound fertilizer. Usually, fattening is done once a week. Outdoor potted plants, water once in the morning and once in the evening every day. When watering, the water should be warmed up before use, and direct watering with well water or tap water should be avoided.

4、 Nursery management.[Potted plant](http://baike.baidu.com/view/2413013.htm)Strawberries should strengthen plant management. One is timely[Shu Lei](http://baike.baidu.com/view/661594.htm)Picking leaves and removing creeping stems. High level flowers that are about to become ineffective should be appropriately pruned during the bud dispersal period. Remove old leaves, residual leaves, diseased leaves, and excess creeping stems to reduce[nutrient](http://baike.baidu.com/view/1449929.htm)Consume and improve fruit quality. The second is fruit shaping. Use iron wire or bamboo sticks to make fruit racks of different shapes, place them in flower pots to lift up the fruit clusters, promote ventilation and light transmission of the clusters, evenly color the fruits, prevent soil pollution of the fruits, and reduce the harm of pests and diseases. At the same time, creeping stems can also be used for artistic modeling to enhance their ornamental value. Thirdly, corresponding comprehensive prevention and control measures should be adopted to prevent and control diseases and pests.

5、 Change the basin. After 2 years of fruiting in potted strawberries, the pot or soil should be changed after fruiting. When changing pots, first remove the plants from the pot, cut off the aging roots, dead roots, and lower aging rhizomes, and then plant them in the new pot soil.

6、 Temperature and humidity. Generally, potted strawberries require a temperature of 20-25 ℃, and the room temperature should be maintained above 15 ℃ in winter. The flowerpot should be placed in a well ventilated and sunny area, and the soil should be kept moist regularly.

Strawberry cultivation is suitable for sandy soil with temperatures between 18-22 degrees Celsius, no rain but sufficient irrigation; The soil layer is deep and contains organic matter, with good drainage and ventilation. It is a slightly acidic soil with a pH value of 5.7-6.4, which is not resistant to severe cold, high temperature, and drought, and is also resistant to rainwater. Strawberry peels are prone to diseases when in contact with soil, affecting their appearance. Generally, they are covered with silver black plastic cloth, with the black side facing down to inhibit weed growth and reduce manual weed management; The silver surface reflects sunlight upwards, promotes photosynthesis, reduces dead corners of fruit exposed to sunlight, and provides insulation in winter, reducing weed absorption of fertilizers and water evaporation. Generally, it is covered with silver and black plastic cloth on both sides, with the black side facing down to suppress weed growth and reduce manual management of weeding; The silver surface reflects sunlight upwards, promotes photosynthesis, reduces dead corners of fruit exposed to sunlight, and provides insulation in winter, reducing weed absorption of fertilizers and water evaporation. Strawberry planting period: July to September, planting strawberry seedlings in October, applying base fertilizer, covering with plastic cloth. The first stage of flowering in November, about 30-40 days after flowering, is harvested. The second stage of flowering in December has a larger number of flowers, the first stage of strawberry harvesting has the highest number of flowers in January and the third stage of flowering, the second stage of strawberry harvesting has the fourth stage of flowering in February, the third stage of strawberry harvesting has the third stage, and the fourth stage of strawberry harvesting has decreased due to the warming climate and difficult care