

INTRODUCTION

World strawberry production is focused in the Northern hemisphere and in the UK they remain the major soft fruit crop in production. At the peak of harvesting in June/July, UK grown strawberries meet 80 – 85% of total demand, any shortfall being made up from imported fruit. Currently 80% of UK strawberry production for supermarkets is grown under polythene tunnels - although this may decrease in the future due to changes in planning regulations. Through the use of improved varieties and production techniques, and by growing crops under polythene tunnels, the strawberry harvest in the UK can be extended to 26 weeks. Fruit yield and quality are affected by several interacting factors, important environmental factors include: temperature; day length; winter hardiness; disease resistance; tolerance of soil conditions and high temperature resistance.

The advantages to the grower of using tunnels are:

- the extension of the fruit season to approximately 26 weeks (May to mid Autumn);
- improvement in class 1 grade fruit and reduced wastage. Class 1 grade (supermarket saleable fruit) for outdoor production is generally 50-70% while under protection it is nearer to 80-90%;
- as the fruit is produced in controlled conditions there can be reduced use of pesticides by up to 50% against Botrytis, downy mildew and black spot;
- provision of an improved environment for the use of biological control;
- increased opportunities for organic production due to the reduced incidence of disease and the enhanced use of predators;
- guaranteed conditions to carry out production and harvesting operations and no need to stop the pickers in poor conditions or to have long waits for early dew to burn off.

TUNNEL TYPES

The two main types used are French and Spanish tunnels. Spanish types have wider bay spans, ridge heights of 4 metres and are all connected rather than being separate, this improves ventilation and materials handling. The plastic in Spanish tunnels stops 1metre from the skirt line also improving ventilation. French tunnels are not as high, tend to be individual structures and the plastic is extended to ground level.

Haygrove tunnels (www.haygrove.co.uk) are available in different configurations from single bays 8.5m wide through multi-spans to telescopic designs that will alter the air volumes according to the time of year and growing style required.

The tunnels are not permanent structures so they can be moved to cover crops as required. The covers can be used to force an early crop or to cover the crop as it becomes ready for picking.

Codes of practice for the use of polytunnels for the production of soft fruit are available at:

www.tunnelfacts.co.uk/code

www.britishsummerfruits.co.uk/polytunnels

www.cpre.org.uk/filegrab/polytunnels-policy

VARIETIES

Strawberry varieties are grouped according to their harvesting periods. Table 1 shows the most widely available varieties. Certified plants should be selected which provide a guarantee of trueness to type and freedom from specific pest and diseases.

The varieties currently available were developed for outdoor production and are not always suitable for growing under tunnels. The main variety used is **Elsanta** which accounts for about 65% of total production. Reliance on one variety can lead to over production in the second and third week of June and a tendency to produce too much leaf for intensive production under protection. **Florence** is an important July cropper and its disease resistance makes it important for organic production. However, it does have a tendency to bruise if harvested in hot weather, which makes it less acceptable to the supermarkets. Further research by DEFRA will determine whether or not new selections of Florence with improved firmness and colour have lost any of its beneficial characteristics.

More work is to be carried out to develop more compact plants with improved fruit to leaf ratios, increased yield per hectare, high grade 1 production and reduced wastage.

Table 1: Strawberry varieties and characteristics

Type	Harvest Period	Fruit Size	Crop	Disease resistance
Early and mid summer Varieties				
Elvira	June/early July	Medium	Heavy	Susceptible to mildew when under stress
Honeoye		Medium	Heavy	
Pantagruella		Medium/Large	Low	
Mid summer varieties				
Pegasus	July	Large	Heavy	Resistance to wilt, crown rot and mildew
Elsanta	July	Large	Heavy	Generally susceptible to disease
Hapil		Very Large	Heavy	Susceptible to mildew and verticillium wilt
Cambridge Favorite	July	Medium	Medium Heavy	Susceptible to botrytis in wet conditions
Alice		Large	Medium	Resistance to wilt, crown rot and mildew
Late Summer				
Symphony	Late July early August	Large	Heavy	Good disease resistance. Grows well in damper conditions.
Florence	Late July early August	Large	Heavy	Good disease resistance especially mildew. Some resistance to vine weevil.
Sophie	Late July early August	Large, good quality	Heavy	
Rhapsody	Late July early August	Medium	Medium	

PLANTING

Strawberries can be planted on the flat or in raised beds, often through coloured plastic mulch with trickle irrigation system laid under the mulch. Raised beds improve drainage and increase the rooting zone available to the developing plants. If the height of the raised bed is 40cm, pickers are more likely to stay standing rather than pick kneeling, this improves harvesting output. For crops established through coloured plastic mulch, runners produced by mother plants are removed and the resulting crowns are the primary source of fruit. Certified runners should be planted into moist well-prepared soil in July, August and September. In late established plantations, runners are deflowered to encourage further crown development and increase yield for the next season.

SPACING

Runners should be planted with the crown of the plant just level with the soil surface. Runners should be planted approximately 45cm apart down the row with 100cm between rows. On lighter soils runners are planted at 40cm centres within the row with 75cm between rows.

Bare root, over-wintered cold-stored plants (-1.5°C) can be planted in early spring with fruit ready for picking 60 days later. The crop can be protected as it gets close to harvesting.

WATERING / IRRIGATION

Strawberry plants should be watered regularly in the first few weeks after planting to encourage root development. Watering may need to be continued under dry conditions. Once fruit set has occurred excess use of water may encourage the development of grey mould (*Botrytis cineria*) which results in fruit rotting. This is a particular problem where crops are irrigated overhead. If irrigated by trickle systems the leaves and fruit remain dry and infection is drastically reduced.

MULCHING

Unless plants are established through polythene, crops should be strawed down to ensure the developing fruits are prevented from coming into contact with the soil. It is advisable to apply slug pellets along the rows and then apply straw ensuring it is pushed into the plant canopy to provide a barrier between the soil and fruit. Keeping the inter row areas mulched with straw will further suffocate weeds and retain moisture for up to six weeks.

WEED CONTROL

Weeds can hamper harvesting and cause uneven ripening. Land should, where possible be free from perennial weeds either by use of herbicide or by cultivation to dry out roots or the use of stale seedbed techniques. Polyethylene sheeting can be laid up to 4 weeks before planting to encourage weed seedlings to emerge and die under the covering. The use of woven polypropylene sheets can be more expensive but they will last longer saving labour and disposal costs.

HARVESTING

The optimum time to harvest strawberries is the early morning when the fruits are cool. If picked later in the day, the berries will need to be cooled to remove the field heat and maintain their quality. Fruit should be uniformly coloured and be harvested complete with a stalk conjoined with the berry.

POST HARVEST MANAGEMENT

Peg down runners to retain matted rows unless grown through plastic or polypropylene mulch in which case, remove unwanted runners. Reduce foliage volume by topping the leaf canopy. Controlled burning of straw mulch will assist in reducing the likely build up of pest and diseases.

PESTS and DISEASES

A range of insect pests can affect strawberries. For example, vine weevil infestation of the roots can result in plant collapse particularly in the spring when rapid growth occurs. The leaves and crowns can be infested with aphids, which cause leaf curling and distortion. Slugs can attack fruit producing holes and rendering the fruit un-saleable. Strawberry seed beetle can eat the seeds from the surface of the berry disfiguring the fruit. For both pests and diseases on strawberries cultural controls can significantly reduce the severity of attack.

Varieties differ in their susceptibility to fungal disease attack. Root and crown rot caused by *Phytophthora* species is most common in heavier soils. Infected plants collapse due to the fungus attacking the roots and vascular tissues in the crowns. Mildew primarily attacks the leaves of susceptible varieties, however in these crops infection can spread to the fruit. The most common fungal disease attacking the developing fruit is *Botrytis cineria* – grey mould. Routine fungicide spray during the flowering period will reduce the incidence of this disease.

Associated CALU Technical Notes:

020202 Field strawberry production