

## **Week 9.**

**This week: watering, the weather and tomatoes,**

### **Why do plants need water?**

Water is taken in by hairs on the roots and travels through the plant in a continuous waterproof column in the stem. It's the waterproof compound in plant stems, lignin, that makes them slow to compost. The water is carrying soil nutrients to the leaves to be used in the photosynthesis process. (Water plus carbon dioxide produce sugars for plant growth and oxygen.)

At the leaves 98% of the water is lost through pores. The evaporation of water from the leaves reduces the temperature of the leaf surface and prevents the leaf getting sunburn. This anti scorching process varies with the wind speed, temperature and the humidity of the surrounding atmosphere. The hotter, drier and windy it is, the more we need to water the plants.

### **When do we need to water plants?**

Some key facts:

- Bare, uncovered soil loses water by evaporation very quickly. Digging the soil makes the situation worse.
- Water evaporates from a wet soil surface quicker than a dry one. It makes sense to water seed beds before sowing and cover them with dry soil. It also makes sense to cover wet soil with a mulch of compost after a spell of heavy rain.
- In most of the UK, evaporation from the soil and plant leaves exceeds rainfall between April and September. To prevent wilting, simply water copiously but infrequently. Try to avoid encouraging surface rooting. This is caused by frequent watering of small amounts. Instead, you need to soak the top 25 cm. (10 inches) of soil every ten days or so between June and August. As an experiment, try digging a small hole after watering to see how effective your efforts have been.
- Water early in the morning rather than last thing at night. You don't want to provide a wet surface that's easy for slugs to slide over.

### **Watering techniques**

Apart from the hosepipe and watering can, you can insert empty flower pots into the soil next to tomato plants and ensure water gets to the root hairs where it is needed. You can invest in seep hoses (Hosepipes that have deliberately got holes in them) and others design trickle irrigation systems. The problem with these can be that once you have buried them its really easy to put your fork through them. We tried using them in the Large greenhouse but eventually gave up due to this problem.

### **Plants try to save water.**

Many plants have evolved structures to control the loss of water through pores. The pores have to be open in the day time both for cooling and to absorb Carbon Dioxide. In "leafy" plants, like brassicas for example, the pores are mainly on the underside of leaves to slow down the rate of evaporation.

### **When do plants wilt?**

Plants wilt when they are neglected. However, sometimes, when you transplant seedlings, such as brassicas, they temporarily wilt in spite of your best intentions. During the transplanting process the root hairs are accidentally damaged. The plant cannot initially take up sufficient water from the soil to match the evaporation from the leaves so the plant wilts during the daytime. However, luckily, it usually recovers at night when it is cooler and the rate of evaporation is less.

The plant may continue to wilt during the daytime until the root hairs have regrown. Soaking the soil around the plant, after transplanting, can help prevent the plant from being fatally damaged.

### **Scorched in the frost**

This happens to early potatoes which have been caught by frost. The remedy is to get up before the sunlight becomes strong and water them. If you don't, the frosted leaves will sun burn and the plant will be badly damaged.

## **The weather**

## **Temperature.**

Temperature affects plant growth. Growth rates increase up to an optimum rate at 70°F or 21°C. Photosynthesis starts at about 6°C. Germination temperatures vary but usually begin at 6°C.

## **Cold.**

Some plants are classified as hardy or half hardy annuals depending on how frost tolerant they are. In reality the distinction is not always useful. Plants can often tolerate a slow reduction in temperature but cannot stand sudden fluctuations. Wind chill and excessive wet weather can also impair plant growth.

For vegetable growers the last frost is one significant time. Tomatoes, cucumbers etc. can be planted outside and potatoes can survive without protection. Another significant event is the first frost. It finishes off runner beans and courgettes and warns you to protect tender plants.

In West Wales there are many micro climates. Frost pockets exist in sheltered areas where air movement is restricted and cold air can become trapped. Blossom and early soft growth can suffer in these areas.

## **Wind**

There are obvious problems of high winds in this area. Apart from physical damage some plants can wind burn. This can be caused either by a chilling effect or by an increase in evaporation from the leaf surface. High winds can cause pollination problems with reduced insect activity.

Protecting plants from the wind can be expensive. Netting and trellis work is one option. Remember you want a structure to absorb some but not all of the wind's energy.

If you have the patience, hedges are a good option. Not only do they reduce the wind but they are a good source of biomass and are the habitat of many useful creatures that prey on pests.

Around here, hawthorn and blackthorn seem to tolerate the salt in the atmosphere and the strong winds.

Hedges provide protection to plants up to 7-10 times their height, but on the leeward side there is always air turbulence.

Permaculture fans stress the importance of trees as shelters. Orchards and coppices, especially to the North of your growing area, are really effective shelters from wind and probably frost.

## **Tactics to beat wind and cold.**

### **Hardening off**

Hardening off plants increases their resistance to drought, cold and wind. Hardening off is useful for seedlings after germination, cuttings after rooting, summer bedding plants and half hardy annuals.

If you've started celery, tomatoes etc. off in a greenhouse etc. it makes sense to bring them outside early on days that threaten to be very warm. To start with you'll need to put the plants back under protection in mid afternoon, but gradually you can extend the time. However remember air temperatures above the ground can be lower than those beneath the soil surface. Plant your seedlings out rather than leave them standing in pots outside all night.

### **Protection**

#### **Natural**

There are lots of simple ways to protect plants from wind and cold. Bracken, straw etc. loosely scattered over crops works in the same way as fleece. i.e. It uses the principle of solar energy stored in the soil to combat cold.

#### **Artificial**

Every organic gardener probably needs some artificial cover to protect plants from the worst of weather and extend the growing season. Frames, tunnels, cloches, greenhouses, fleece etc. If you are going to invest in a greenhouse, polytunnel etc. look at how you are going to use the structure especially in winter.

## **Tomatoes**

Blight is an air borne fungal infection that can ruin crops on humid days especially in July and August. Non organic growers spray a fungicide on their crops when the risk of blight is high. We can't do that so we need to employ other tactics.

Our tactics to avoid blight and produce an acceptable crop.

Potatoes are also affected by blight. However we planted our crop very early in the season and will harvest them in July. They won't be around to spread the problem.

Tomatoes grown in polytunnels and greenhouses seem less susceptible to blight. It's probably more difficult to create the blight spreading humid conditions in those environments.

The tomatoes we plan to grow outside are going to be spread about in our plots. We'll keep them well away from our potatoes but otherwise "dot them about" where there are spaces, adding well rotted compost to the soil. Our aim is to try to encourage lots of air flow around each plant. We want to avoid creating stagnant, humid conditions where blight thrives.

Tomatoes are greedy feeders. It is quite tempting to overfeed them and produce leafy luxuriant plants that will be more blight susceptible. Consistent watering stops fruit from splitting.

### **Tobacco mosaic virus**

I think this is what is wrong with our tomatoes, though I cannot be totally certain so have sent some samples away for analysis.

The symptoms of this virus look very similar to herbicide damage, which tomatoes are very vulnerable to. The only way I can see that that could have happened in this case is if the straw, which they are mulched with, has residues on it. I think this is unlikely as we mulch tomatoes with straw from the same batch last year, but it is possible.

### **Symptoms:**

A leaf mottling of variable colour from indefinite patches of pale green to vivid, mosaic bright yellow and green. Groups of leaves may be puckered or dwarfed and show narrowing and indentation, a fern like symptom, until in severe cases they become tendril like. The entire plant may be reduced in size and becomes spindly with few fruit.

### **Sources of infection**

It is extremely infectious, so can be transferred on hands, clothes, in compost etc. It is not transmitted but aphids. Do not grow near antirrhinums, peppers, petunias, potatoes or tobacco, all of which maybe sources of the virus. Do not smoke in polytunnels as the virus may be present in the tobacco. Wash hands after smoking before handling toms.

### **Treatment**

Prevention by hygiene.

Remove and destroy infected plants.