

### GLOBAL WARMING PROSPECTS FOR CIDER ORCHARDING

The UK is really on the northern limits for apple growing. Fortunately our cider apple varieties are suited to our climate and do well. When global warming brings longer, warmer seasons, this will suit some of the more exotic dessert apple varieties now only grown in warmer countries. But will our cider apples benefit from the change or will it all happen too quickly for us and them to adapt? Undeniably a longer warmer summer should mean heavier crops of vintage juice quality fruit, but global warming also brings with it many negative features; storms, gale force winds, flooding and excessive rains; and in the growing season, high temperatures bringing heat stress followed by droughts bringing water stress. Above all, global warming brings with it, unpredictability, and this is probably one of the most difficult aspects cider apple growers will have to cope with.

Our cider apple cultivars actually need a period of winter cold to ripen their wood and prepare the buds for the onset of spring. We have experienced mild winters for a number of years now and already the variety Dabinett has shown signs that that it sometimes gets an inadequate period of dormancy. When spring comes, trees are confused, they bloom sporadically and many of the young shoots remain dormant all summer, their leaf buds tightly closed. Browns Apple is very different, it has less winter cold requirement and is ready to start into growth after only a short rest. Thus a mild spell in January can be enough for buds to start moving, only to be stopped again by colder weather before the real spring gets going. Blossom is weakened by stop-start springs and becomes much more reliant on good pollinating conditions to set sufficient fruits. Also, should our climate get excessively warm, many of our temperate, deciduous trees may hold onto their leaves in winter, perhaps never loose their leaves, and find it hard to know when to flower at all. Will we have to resort to defoliant such as are used to control temperate trees in tropical climates?

Some years ago our flowering records were already showing that the average date for full bloom for Michelin had advanced by 7 days since the 1940s. Other varieties are responding individually to climate change. Those needing cross-pollination could find themselves flowering out of sync with their neighbours and will only manage to set a few fruit on their own. If some already early varieties like Katy blossom even earlier, they could run the risk of catching late frosts - whilst frosts are still on the 'warming' menu.

All being well, by flowering time the blossom will still be strong, but what about the bees? Warmer winters keep honey bees more active searching for dwindling supplies of nectar. This may be fine whilst they can be artificially fed in the autumn, but it is detrimental in late winter. Bees from hives weakened by lack of food may not be strong enough for the hard work of adequate pollen transfer, and if blossom is also weakened, flowers may only remain viable for a day or two. In these circumstances, a period of calm, warm weather must be prayed for, loudly!

The last few years have shown us several record breaking unseasonable weather events; last winter's persistent cold NE winds, last July's prolonged heat and drought, this mild [so far. . .] but excessively wet and windy winter. This unpredictability puts extreme pressure on our orchard protection programs by narrowing spray opportunities and impairing spray efficiency, with the risk of poor pest and disease control. And these extreme weather events are predicted to get even more severe. . .

The disease that gives the cider growers their biggest headache is apple scab, a fungus that attacks both leaves and fruit, severely reducing the harvest in bad years if not adequately controlled with fungicidal sprays. Scab survives from year to year on fallen leaves as spores that are released in the spring to infect opening leaf buds. Although warm weather may speed the decomposition of the old leaves, it may also increase the number of viable spores surviving into spring. To protect the sensitive developing young leaves from the annual spring explosion of scab spores and help delay the development of disease, most cider growers put on a protective fungicidal spray just before bud burst. However, if unseasonable, unpredictable weather makes bud-burst less spontaneous, it will be almost impossible to time this spray accurately. As the disease develops, scab relishes those warm, wet, close conditions most likely to increase in intensity with global warming. So, after a poor start, if wet, windy conditions continue through spring, lost spray opportunities would mean that scab could run wild and unchecked, with severe consequences. Should the summer be hot and dry, as last year, then scabby leaves may drop prematurely and spores perish. Good, but hot, dry summers will mean more powdery mildew! Weather extremes either way will bring their own troubles.

Other diseases; canker that enjoys wet winters and stormy winds to spread from tree to tree; crown rots, collar rots, wet feet and root rots that follow winter water-logging, will also enjoy the future. With hot summers we are likely to see the return of a more sinister disease, fire blight, caused this time by a bacteria with no spray chemical to control it. A devastating, once notifiable disease, fire blight is rife in parts of Europe. The last outbreak in the UK was in 1986 when the south of England was enjoying an early summer heatwave with daily temperatures up around 25°C. The lethal bacteria are spread by pollinating insects during flowering. Infection is rapidly apparent as blossoms turn brown and spur clusters die. Secondary infection from bacterial ooze is spread later by wind and rain into newly growing green shoots. Although mature apple trees may only suffer blossom spur and limb losses through fire blight infections, young trees and perry pears are often quickly killed when bacteria spread through tender tissues back to the main trunk. Fire blight survival is dependant on alternative hosts such as many common wild and ornamental shrubs of the Rose family growing in hedges, gardens and nurseries. It is passed to apples when their flowering is sometimes coincidental. Given the right conditions of hot sunshine, together with unpredictable flowering times, followed by thunderstorms to disperse infection, fire blight can literally spread like wild-fire through a young orchard. The summer of 2005 saw just such an outbreak in South Somerset from an infection in a nearby hedge. Usually fire blight does not cross the Channel but, if we inherit a continental climate, fire blight is sure to take up permanent residence in our cider orchards.

What else might our new climate bring? Green flies on the winter rose bushes, and Red Admiral butterflies hatching this record-breakingly warm January. Disastrous for the butterflies but providential for hungry blue-tits. Perhaps some of our insect pests such as aphids and apple suckers will follow the same pattern with equally dire consequences. What is certainly already happening, pest hatch and emergence is becoming sporadic and prolonged, making accurate targeting of insecticide sprays for good pest control difficult. Some insects are able to indulge in multiple generations during our warmer, longer summers, thus doubling the damage they cause. Codling

moth, a summer pest that bores holes in apples, is normally left unchecked in cider orchards, even though its damage creates wounds for rotting fungi to take hold. But should two generations of codling moth become the norm, their contribution to rotten fruit among the apple harvest will unquestionably not be tolerated.

And what of new pests arriving from exotic climes? We have already seen the introduction of Gypsy moths and Harlequin beetles to southern England. These pests come without their natural enemies. Any one potential apple pest could upset our carefully engineered and nurtured balance of native predators and parasites which controls our indigenous cider apple pests so successfully at present, should global warming come too quickly for them to adapt to the new taste of the immigrant pests. Will our Integrated Orchard Management need to be further augmented by chemical weapons?

I think that we can anticipate a few problems coming to cider orcharding during the next decade. Hopefully these will be surmountable, but in the light of the recent Report on Global Warming, if not enough action is taken to halt the slide . . . perhaps we shall have to shift our cider orchards up to more northerly climes to make way for olive groves. A less talked about but even more devastatingly sinister prospect is the slow down and possible cessation of the Gulf Stream around our shores as the Greenland ice-cap melts. This would surely send us into a Scandinavian maritime climate that our cider apple trees might survive, but it could be bad for the sales of all but mulled cider. Let's hope that all of us, including the powers that be, knuckle down to halt the progress of global warming.