MODELLING WEATHER EFFECTS ON (CORDON) SWEET PEA GROWTH

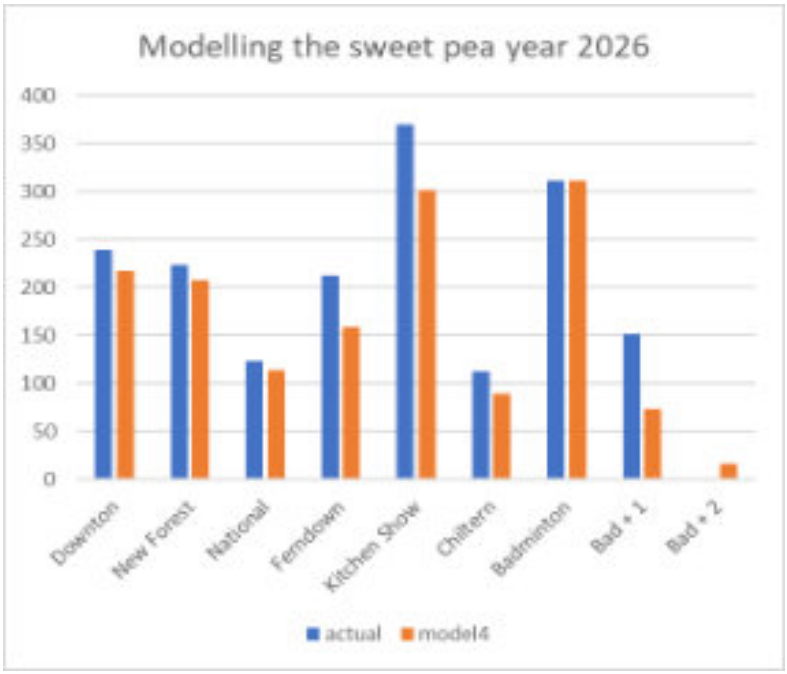
SUMMARY

In this note, we model cordon sweet pea growth on temperature data. We allow for the effects of bud drop and heavy rain. Although this is a simple model, it tells some plausible stories. It produces sobering estimates of the likely (low) number of stems that each cordon sweet pea will produce in coming years. We may see only half the number of stems produced per plant, compared with 40 or 50 years ago. The only question seems to be how fast this will happen, not whether.

Average temperatures are rising, and some aspects of the weather are becoming more variable (eg rainfall). We know that the sweet pea season has been shifted forward by perhaps three weeks, and has become shorter. 2024 and 2025 were both 'hot' seasons, as average temperatures experienced through the sweet pea season continue to increase. 2026 was a particularly challenging hot and dry season. In fact, temperatures over the season are likely to end up as much as 1 ½ C higher, on average, than in the 1970s & 1980s. Each season will differ, some will be better and some worse. But what we are trying to extract is the broad effect from climate change on sweet pea growing – particularly the effect of the rise in average temperatures.

Natural processes are extremely complicated and hard to model. What I had in mind was a very simple calibrated model to capture the essence of the way a (cordon) sweet pea grows, and how it is affected by temperature. In an ideal world, I would be able to estimate such a model using hard data, and capture many more aspects of the weather – rainfall, humidity, cloud cover etc. I don't have access to all the data one would need, so I built a very simple model.

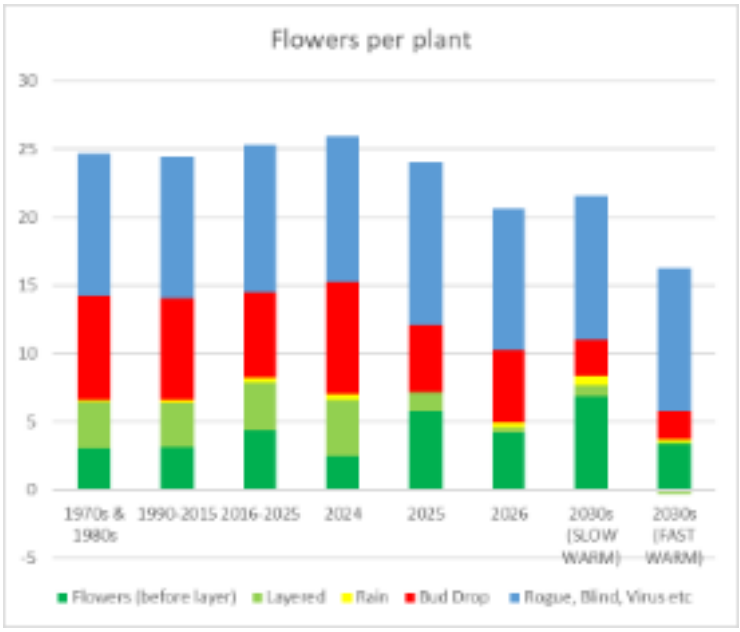
How would we know if this simple model works? We can use it to track the cuts I had for my 2026 show season. I exhibited at Downton, New Forest, The Early National (Wisley), Ferndown & Chiltern shows. In addition, many people will have seen my 'kitchen show' on Facebook, when I staged 20+ vases of 15 stems in my kitchen. Last, but by no means least, I did two large cuts of blooms for the wonderful NSPS stand at RHS Badminton. In all, I cut 1500-2000 stems for shows and displays. See the chart, which shows estimated cuts of stems per show. The blue bars are (approximately) the number of blooms taken to each of the shows, while the orange bars are the cuts predicted by the model based just on temperature & rain data in my local area.



I fell a long way short of what I wanted to take to the Early National and was only able to stage 100-150 stems of Spencer Sweet peas – the big dip in the third set of blue and orange bars. Bud drop hit really hard in the days up to the show, after a colder/cooler period. I cut off hundreds of stems a day as the buds fell.

The model captures this 'dip' fairly well. After the National, numbers of stems rose as temperatures increased. But we rapidly reached a point where temperatures were too high and plants and blooms fried in multiple days of 30C+ heat – we just about made Badminton at the start of July. I could not take any blooms to the late National, so had to content myself with a visit! The final column shows Badminton plus two weeks – I had no show that week and the sweet peas were finished.

We can take this model and plug in temperature and rain date from earlier seasons to see what might have happened (all else equal). We will work in flowers per plant space, as this abstracts from whether you might be growing 100 plants or 1000! In the chart the green bars represnet the showable blooms, wheras yellow (rain damage), red (bud drop) and blue (losses from all other causes such as virus, rogue plants, insect damage etc etc).



The higher temperatures over the past decade (2016-2025) compared with earlier decades (eg 1970s & 80s) generally ought to have produced more blooms early in the season (the dark green bars in the third column of the chart are bigger than in the first and second columns). That is because slightly higher temperatures are associated with lower bud drop (the red bars are smaller in 2016-2025 than in the first two columns). In other words, although there are similar maximum numbers of blooms available to start with, around 25, a few more stems make it through to shows. With careful husbandry and layering, that could have produced as many (or more) blooms in recent decades than in the 1970s and 1980s (the light and dark green bars taken together).

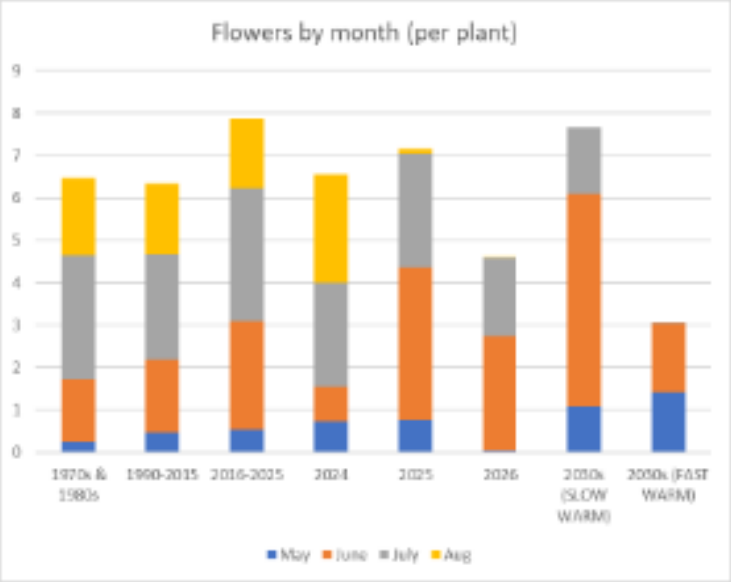
We may now have now passed the tipping point, as the increase in temperatures starts to stunt growth and fry blooms earlier in some (not all) seasons. That also starts to reduce any benefits associated with layering. The net result of the two forces induced by warmer temperatures (lower bud drop v greater stunting) is eventually fewer blooms for the season as a whole. That is possibly why we see 2024, 2025 and 2026 producing declining total numbers of blooms per plant, even after layering. In fact, in 2026, layering produced no real benefit, as the plants literally fried whether layered or not!

It is difficult to illustrate the effects of increased weather volatility. But it is worth remembering that an early heat wave could destroy plants very early in a season and result in very few blooms (the overall height of columns dips below 25). Although blooms may stand a gentle rain, a very heavy downpour is likely to damage exhibition blooms. Both of these effects are captured in the above estimates.

I found these estimates of numbers of blooms per plants (the dark and green bars) striking. Is it really the case that each plant produces less than 10 showable blooms? If I think of how many plants I have grown this year, and how small the available cut was at even my most successful show (New Forest)…the estimates come into sharp focus. Even if we don't believe the precise estimates from this simple model, the changes from year-to-year may well tell us something.

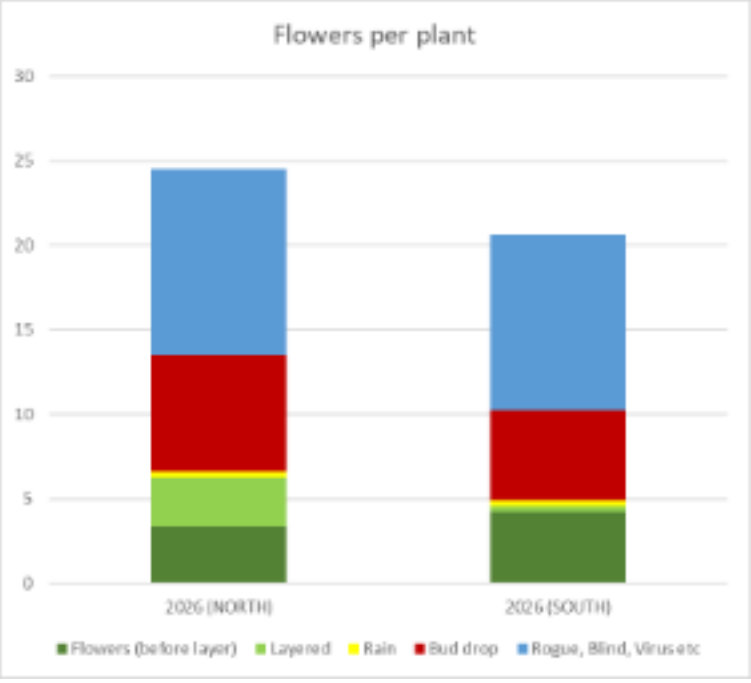
The next chart takes the number of available blooms after layering (the light and dark green bars above) – and indicates what month they would fall in. We see evidence of more early blooms in May (blue), and

particularly June (orange) as the climate has changed. July (grey) is reasonably stable (until 2026!), while there has been a distinct squeeze in the number of August blooms (yellow) in some years. In the South, that makes exhibiting at any August shows very hard indeed.



The final 2 columns in the above charts look into the crystal ball. They project forward what might happen if the current trend towards higher temperatures continues, as seems likely. I have attempted to roll the estimates forward to allow for a minimal degree of warming – labelled SLOW WARM (0.03C rise per year, as measured over the past 40 years). If that is what we see, then the effects will be very gradual. We may actually see higher numbers of blooms in some years as bud drop falls. But we'll see smaller benefits from layering. Blooms will mainly fall in June and ever fewer into July. If, however, warming is faster than we've seen on average over the past 40 years – more akin to what we've seen in 2026 – then the effects will be faster and more immediate (there is some evidence that climate change effects are accelerating and non-linear). The final column is indicative of conditions worse than in 2026. What is striking is that what few blooms are likely to be available could well come as early as May and certainly no later than June.

A final calculation is to replace my temperature data based on conditions in the South with those seen in the North (I used data for Yorkshire rather than Somerset). This confirms that the North is experiencing similar changes in growing conditions, but starting a couple of degrees cooler than in the South. So it will take a few more seasons before we see the conditions reach what we've already experienced in the South in 2025 & 2026.



It may well be that by planting different varieties, or growing differently, we can mitigate some of these effects. But it certainly seems that growing 'as we've always done' isn't going to work.

A longer version of this paper is available which explains the model in a little more detail. The model may well change as I develop it further, or get more data. So the results shown here should be treated as provisional and subject to further revision. I would welcome any thoughts on the above observations & techniques.

Neal Hatch

30 August 2026