EARLY FORCING OF PEONIES (HOOP HOUSES AND GA3)

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This year we tried forcing some peony flowers into earlier flowering so we would have more of them before Mother's Day (they usually start flowering outside after that date). We bought some new hoop houses to this end and placed them over some of our peonies. We combined this with the use of GA3 (Gibberellic Acid) as this is the standard procedure in Israel to get very early flowering peonies in March and April. Now we had used this before but the results had been mixed. One year they were about one week earlier, other years there wasn't any difference. Next to that, not all cultivars reacted in the same way, with some of those years that it did work, still having some cultivars where all the hard word was done in vain. As GA3 isn't particularly cheap and we don't like working for nothing, we never did that extensively these last years. But after years of trial and error, we got to be more confident and thus this time we treated far more plants than before. So here's how we went about it:

- We used 250 cc of water at 100 ppm GA3 per plant (take a bucket of 10 l, add a tablet with 1 g active ingredient (a.i.) of GA3 (which is pretty standard) and you have it, that will then suffice for some 40 plants more or less). The goal is to 'wet' the 'eyes', not the roots.
- We treated our plants mid December (17-18-19), not in January or February before they come out of the ground. We have found that treating them too late doesn't add any extra earliness. The whole point of adding GA3 to the buds is decreasing their cold requirement, but if you add it when the buds have already received enough cold, then nothing happens.
- Then (also halfway December) we already placed plastic over the hoophouses, which is far earlier than usually done, but this way they could already start growing on sunnier days when temperatures rose higher than outside.

Now that all worked fine as can be seen from the image below:

The beginning of the two rows on the right didn't receive any GA3 treatment and didn't sprout until a few weeks later. There are two rows of Old Faithful on the left and four of The Fawn on the right. Image taken March 17th.

The row at the back shows Mme Claude Tain on Feb 28th. The three plants on the right didn't receive any GA3.

'Great', you might say. There was however a small problem (as there always is) because humidity in the hoop houses was very high during January and especially February when the treated plants were already growing strong. Normally you'd leave the front and back of the hoophouse open so the wind can blow through it, or roll up the plastic on the sides, so that the wind can remove the excess water on the plants. Unfortunately this year there were several very very windy days where we simply couldn't do that as otherwise the plastic would simply be torn. So the foliage and buds remained wet for several days or even weeks. We all know what this results in and we thus lost over half the stems to botrytis with the remainder often having leaflets partly damaged by the fungus as well. We did spray with fungicides, but it didn't help enough to be honest. The graphs below show the relative humidity measured inside the hoophouse and outside. The RH inside was usually higher, and over time as Spring advanced RH lowered both inside and outside. April 8th was the warmest day during the four months up to May and the other graph shows the evolution over the day. Again inside the RH was most of the time higher. Next year we'll either roll up the sides earlier or place some fans inside.

Relative Humidity (%) hoophouse, inside & outside, Jan through Apr 2020

Relative Humidity (%) hoophouse inside & outside, April 8th, a very hot and sunny day

Old Faithful on March 12th, showing botrytis damage from being constantly 'wet' due to the high relative humidity

Now not all was lost and when did they flower you might ask? Mother's Day here was May 10th, so early May was the goal. Well, the plants treated with GA3 could all be cut in the second half of April and by the end of that month as good as all of them were gone, except for those 'eyes' that hadn't received any GA3 and which flowered somewhat later. At least that is the case with the lactiflora varieties The Fawn and Mme Claude Tain. Lactiflora varieties react well to GA3 treatment, which is much less the case for hybrids like Coral Charm or Coral Sunset, which we had tried the years before. Old Faithful does react to the GA3 but it flowered somewhat later, beginning of May. Although it is late flowering for a hybrid, outside it doesn't usually flower after those lactiflora varieties. Which is something we've noticed before: the hybrids don't react in the same manner to early forcing so the natural flowering sequence of different varieties may differ somewhat when grown inside a hoop house. Some plants of The Fawn had not received any GA3 so we would be able to compare. Those did flower early May, just in time for Mother's Day. As they had only started growing several weeks later the weather was far less stormy then and thus we could let the wind blow through it, resulting in no botrytis at all. The final result there was that we had double the flowers compared to the GA3-treated ones and it being the week just before Mother's Day they sold for the same price as the earlier ones, so financially the whole experiment wasn't the best exactly, but not all years will be as hot as this year.

The Fawn in the hoophouse flowered some 4 weeks before the ones grown outside. Mainly due to the higher temperatures in the hoophouse of course. The following two graphs demonstrate this. The graph from April 8th again shows the warmest day and the difference between the hoophouse and outside. Temperature within the hoophouse that day was extremely high and we then rolled up the sides of it as well to have comparable temperatures as outside. The difference thereafter was smaller of course.

Temperature in the hoophouse and outside

Temperature difference in the hoophouse and outside on April 8th, the warmest day this season.

The GA3 treatment is different from what most growers with hoophouses do. So they'll usually cover their hoophouse much later, when the plants have

received enough cold, which will be somewhere at the end of January or February here in Belgium. After flowering the plastic is removed from the hoophouses so that they receive natural rain. During the growing season some drip line irrigation was used to avoid wetting the leaflets as they don't dry as easily as outside. Mention also that it will be easier to grow peonies in a larger hoophouse compared to a small hoophouse. There's much more cubic metres of air inside a large greenhouse relative to the surface of plastic, thus the same surface must heat much more air and temperatures will thus rise far slower and vice versa, resulting in a far more stable climate which is also far less prone to botrytis. Say we have a hoophouse some 6 metres wide and 10 m long. This will result in some 90 m^2 plastic surface ((6*3.14*10)/2) and some 140 m^3 of air ((3*3*3.14*10)/2). But if the hoophouse is 12 metres wide? The plastic surface will simply double to 180 m^2 ((12*3.14*10)/2)) whereas the content of air is an exponential curve ((6*6*3.14*10)/2), resulting in 565 m^3. In other words, in the small hoophouse 1 m^2 must heat up 1.5 m^3, whereas in the large hoophouse this 1 m^2 must heat up 3 m^3. We have both small and large hoophouses and the differences in botrytis damage can be large.

The GA3 treatment can also be applied outside. When done early enough, it will result in peonies flowering about 1 week to 10 days earlier (depending on the weather of course). We also applied some GA3 to peonies growing outside, at the same date, Dec 18th, and we thus had The Fawn ready for cutting at four different times this year:

End of April in the hoop house, treated with GA3
Beginning of May, untreated in the hoop house
Mid May outside, treated with GA3
End of May, naturally flowering without any help from us

Only between the untreated ones in the hoophouse and the treated ones outside did we have a short period where we could not cut any, but some short cold storage can easily solve this minor issue. All in all, forcing peonies this way is a welcome addition to growing them the 'natural' way as we all know that results in a 'peak' bloom time, very pretty, but also very short.

Miss America, some plants treated with GA3 on Dec 17th, growing strong on March 12th whilst the untreated ones on the left and right of it are not sprouting yet.

The end result, April 27th, ready for auction