

SONSATION CULTIVATION MANUAL

2020

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Sonsation, a tasty mid-range variety

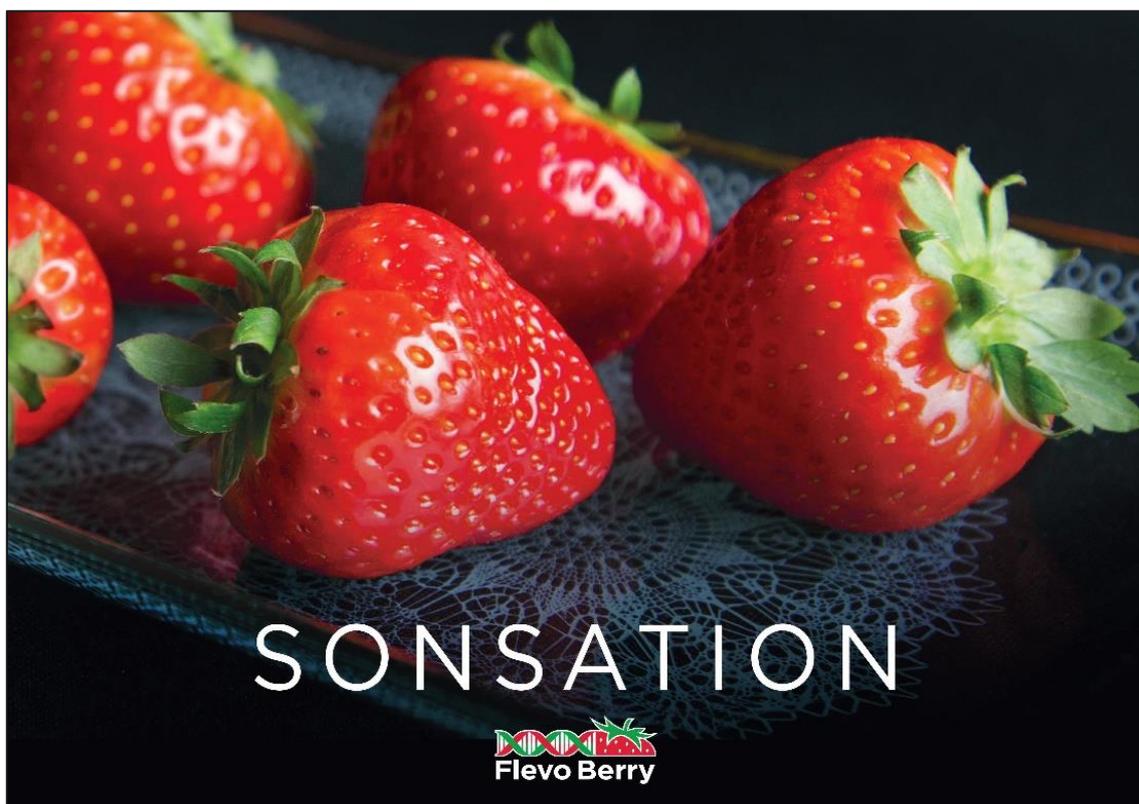
Plant variety rights number: 2015/2402

Plant variety rights owner: Flevo Berry Holding

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Sonsation – a brief summary

- Juicy strawberries with a good flavour
- Glossy fruits
- High tolerance to Phytophthora cactorum
- Easily visible fruits, easy to pick
- Strong root development
- Easily makes side crowns
- Very suitable for early greenhouse cultivation
- The cold requirement is comparable to Sonata, about 1,650 hours < 7 °C
- Do not plant too closely, because of the risk of Mucor
- Truss teasing is faster than with Sonata
- Increased K requirement from the beginning of flowering
- The harvest starts at the same time as Sonata
- Mid-harvest date is a few days later than Sonata
- At the end of cultivation, chlorosis can occur in the old leaves
- Exceptional pollen quality



The variety

Sonsation was developed by the Flevo Berry breeding programme and is the first introduction in the mid-segment. Sonsation's fruit looks attractive. They are bright red, with a conical shape and lots of shine. The calyx looks fresh and dark green. Sonsation retains its shine, even under more difficult conditions and after storage. The strawberries have an excellent flavour, which will tempt you to eat the entire bowl in one go. The juicy bite gives you a great flavour experience. You immediately taste the sweetness of these strawberries, which is followed by a fresh aftertaste.

Cultivation

Sonsation is an easy growing, healthy plant. The plant is compact with upright foliage. Sonsation makes side crowns easily, and that ensures its high yield potential. Flower clusters are located at the same height as the foliage and are therefore protected against spring frost. Sonsation has more flower trusses, but fewer flowers per truss compared to Elsanta.

The flower pollen is always excellent in quality and it ensures good setting. The fruits are well-distributed and easy to pick. The strawberries are uniform but the first fruits may be slightly grooved. Make sure there is enough available Mg and Ca for regrowth and flowering. Increase K earlier than with other varieties, for example when the first flowers develop into fruits 1 cm in diameter. The firmness of the fruit is comparable to that of Sonata and Elsanta. So, harvest them with care.

Sustainability

Flevo Berry's vision is to develop strawberry varieties with a good flavour, and that can be grown with respect for people and nature. All trials show that Sonsation grows easily due to its highly developed root system. The variety has a strong barrier against *Phytophthora cactorum*. The variety shows a good tolerance to mildew in open ground cultivation, with similar preventive measures to those used for Elsanta and Sonata.

Cultivation of tray plants

Cuttings

Compared to the Sonata variety, Sonsation cuttings are often slow to take root but they catch up quickly once rooting has started.

It is important that the cutting material is fresh and healthy. Limp cuttings or heavily mildew-infected ones will cause stress on the tray field. This leads to the plants becoming generative too quickly, followed by pre-flowering in the fall or soon after transplanting in the greenhouse.

Fertilizing strategy for tray plants

Both Delphy (Worldwide Expertise for Fruit & Flowers) and the Trial Centre PC Hoogstraten have carried out research into cultivation of ideal tray plants. Both sources have determined that Sonsation benefits most from early fertilization on the tray field. This leads to the plants already forming sufficient side crowns by the beginning of September and the flower development can start in time in all the side crowns. The majority of the side crowns will then form one or more flowering fruit stalks. The number of trusses can be limited or increased, depending on the degree of fertilization.

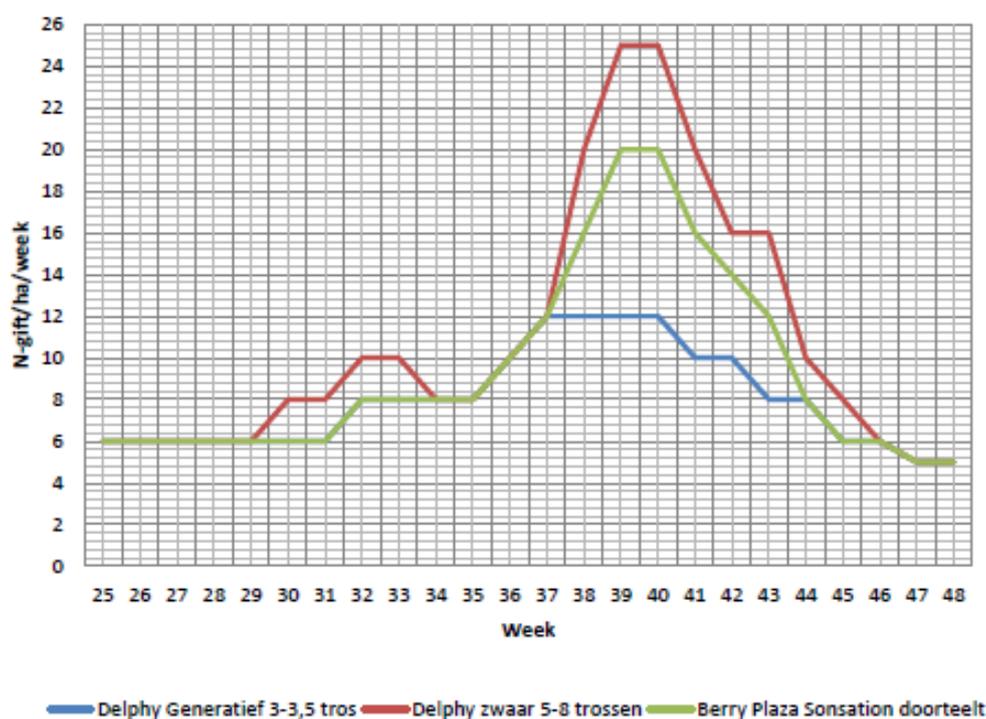


Figure 1: Fertilization line Sonsation plant type continued continuous culture/racking

In a trial at PC Hoogstraten in 2018/2019, plants were propagated on July 3rd. A basic fertilizer was added, 5 kg of Osmocote per m³ of substrate. Some of the tray plants were started relatively early with supplementary fertilizer (27/7) but they also stopped early (19/10). Another part only had supplementary fertilization from 24/8 but then until 16/11. In all the plots, fertilization took place on 2 levels, with 158.5 kg N/ha and 213 kg N/ha respectively.

A spring planting was carried out in the greenhouse as follow up to this. This clearly showed that early fertilization resulted in higher yields than mid-to-late and late fertilization strategies. There was hardly any difference in yield between the high and low levels. So, exaggerative amounts of N on the tray field is therefore not necessary.

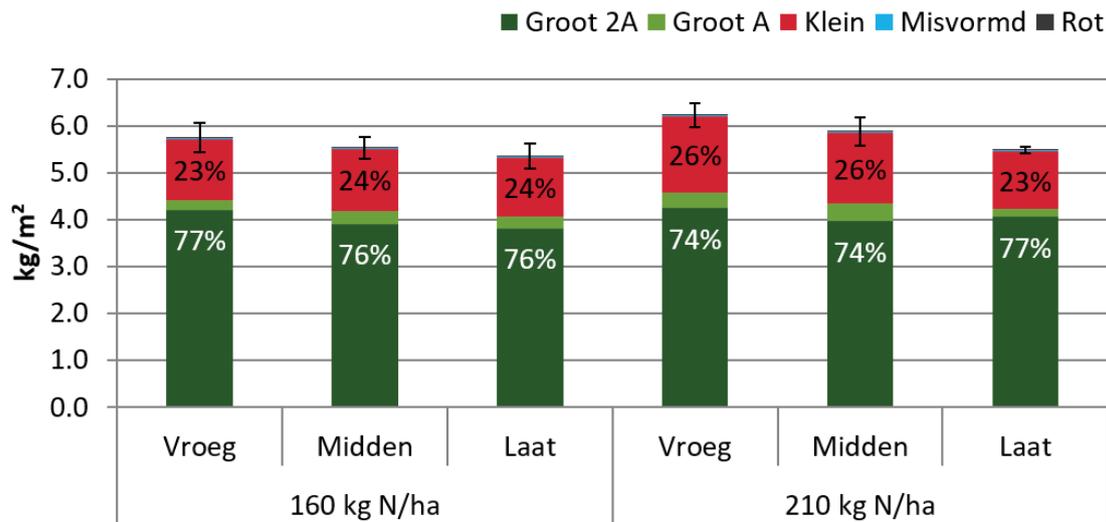


Figure2: Production results in the six fertilization units.

Flower induction and fertilization

In general, the flower induction starts with Sonsation a few days earlier than with Sonata and Elsanta. The level of fertilization must be kept down until flower induction starts. After flower induction, the fertilization with N can be scaled up. Below you can see an example fertilization schedule for tray plants, intended for a continued cultivation of Sonsation.

	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	N totaal	N-totaal W33-W46
Delphy Generatief 3-3,5 tros	6	6	6	6	6	8	8	8	8	10	12	12	12	12	10	10	8	8	6	6	5	5	178	130
Delphy zwaar 5-8 trossen	6	6	6	8	8	10	10	8	8	10	12	20	25	25	20	16	16	10	8	6	5	5	248	194
Berry Plaza Sonsation doorteelt	6	6	6	6	6	8	8	8	8	10	12	16	20	20	16	14	12	8	6	6	5	5	212	164

Table1: N-application in kg/ha/week

Tray plants for long storage

For long storage, the plants must be able to store enough sugars. Sufficient chill units are required for this. In 2018, PC plants were packed at PC Hoogstraten Sonsation after 948 chill units (Hoogstraten-cold-model)/704 cold hours. This sum was reached in the second week of December.

Research at PC Hoogstraten with the Elsanta variety showed that the optimal time to freeze tray plants intended for long-term storage is after they have undergone around 600 cold hours at $<7^{\circ}\text{C}$. Much more or less than 600 realized cold hours results in production loss. It is likely that the optimal level of cold hours for Sonsation is certainly not lower than the 600-hour period mentioned above.

Tray plants for early greenhouse cultivation

For early greenhouse cultivation, slightly heavier tray plants are desirable, with a spread potential of 6 to 7 trusses per plant. Graph 1 and Table 1 from Delphy show the fertilization strategy for this type of plant. Runners should preferably not be taken later than 10 July.

It is important to keep the tray plants in the cold store for at least 6 weeks, to allow them to undergo enough cold hours. In standard situations, the optimal number of cold hours is around 1,650. If the amount has to be compensated by more than 1/3 with lighting, it will be difficult to achieve sufficiently balanced growth.



Early spring production (greenhouse)

Planting time, plant type and planting distance

A crop for early spring production can be planted from the third week in December, provided the tray plants have spent at least 6 weeks in a cold store. Tray plants with a spread potential of 6 to 7 trusses per plant are recommended. In general, early January planting yields more kilograms than planting in mid-December, simply because of the difference in the preceding cold. However, early planting yields an earlier harvest, which may be a reason for wanting to plant earlier.

Usually, planting density of 12 plants per linear meter of gutter is used for this cultivation. An alternative way to determine the planting distance is to divide the desired number of flowers per linear meter by the number of expected flowers per plant. An average number of flowers per truss is 7.3 to 7.6 with Sonsation. With an average of 6.5 expected trusses per plant, you will get 50 flowers per plant. So, if you have a goal of 600 flowers per linear meter, you would end up with 12 plants per linear meter.

Climate

After planting it is important that Sonsation is able to root in gently. Maintain the day temperature at 12 °C and 8 °C at night for the first 10 days. Keep minimum heating tube running until 15:00 to encourage plant activity. And set a limited minimum vent position here too.

From 10 to 14 days after planting, cyclical lighting can be turned on, from sunset to sunrise. The lighting may be turned off again when the petioles are 20 to 25 cm long. Longer exposure to lighting can cause the fruits to become more elongated. Simultaneously with the start of lighting, the heating regime may be increased to 15 to 16 °C during the day. From then on, it is important to aim for a daily benchmark temperature of 13.4 °C, plus an increase of 0.2 °C per 100 Joules/cm² of the daily radiation sum.

In the early morning, the temperature should not rise too quickly, as this can lead to an overly thin crop. In this relatively controlled manner, plant growth can remain in balance. Exceeding this standard too much results in lost plant energy, which is at the expense of yield and quality.

Fruit quality

Pollination is important for a good fruit shape. Despite Sonsation's regularly good flower quality, it is recommended to encourage good pollination by using a minimum heating tube in combination with minimum venting based on humidity. In addition to better pollination, this generally leads to higher net photosynthesis too.

In early spring cultivation, Sonsation retains its fruit size better than other varieties used for this growing schedule. This is due to the generally better spread of the harvest. A mean daily temperature of 13.8 °C is sufficient for good fruit colouring. The advice is not to force any harder, because the mid-harvest date cannot be brought forward much.

It is important to keep a close eye on the drainage percentage during the afternoon, to avoid jeopardizing good strawberry growth. The drainage percentage may seem OK for the entire day but the distribution over the day is at least equally important. Occurrence of buckled trusses is often related to this. Short-term water shortages result in reduced cell tension, which can cause sudden fractures in heavy trusses.

Sonstation

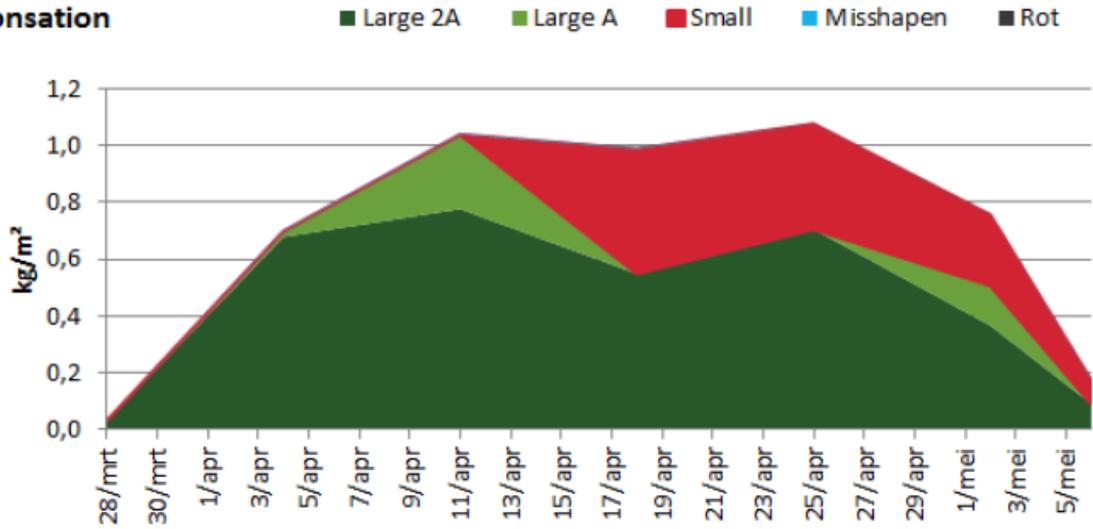


Figure 3: Harvest progress in early greenhouse cultivation

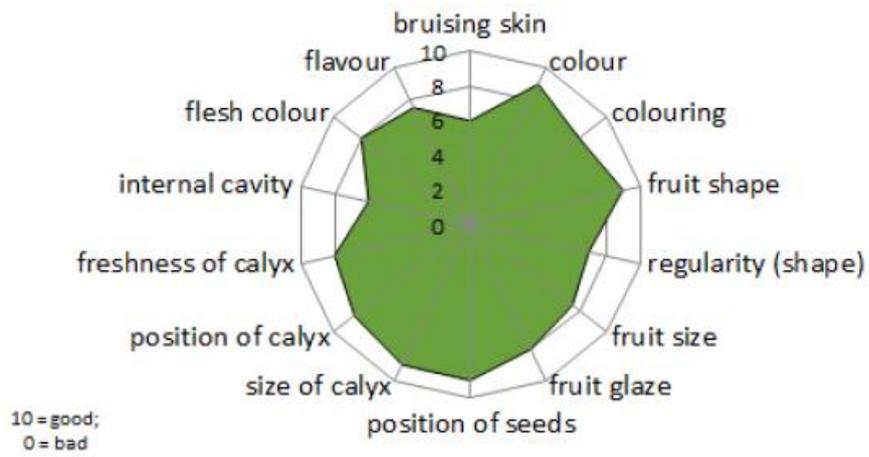


Figure 4: Fruit quality in early greenhouse cultivation

Double Cropping

Planting time, plant type and planting distance

For continuous cultivation, it is best to plant no later than the first week of August, plant density 10 plants per linear meter of gutter. Planting later can cause problems with harvesting the last fruits of the autumn harvest, as well as with accruing enough chill units for the spring harvest. Early planted Sensation can be chilled early in December and therefore generally show better elongation in the spring.

As a plant type, we recommend a medium size tray plant, with runners being cut around July 20 and grown according to a proven fertilization strategy. See Table 1 and Figures 1 and 2 for the grow-out cultivation strategy for the tray plants.

Winter rest

After the autumn harvest, the plants must be allowed a period of recovery before they can actually start the rest period. For sufficient recovery, post-harvest heating is sometimes necessary to ensure sufficient flower formation. If the harvest has ended early, a post-harvest heating regime with a mean daily temperature of 11.5 °C to 12 °C is sufficient, and the plants can start the rest period from Christmas. When the harvest has not ended until around Christmas, a mean daily temperature of 13 °C is desirable for the recovery period. But that may mean that the actual winter rest can only start around January 20.

Firstly, a well-developed root ball that makes the plants strong and resilient is a signal that the plant has recovered sufficiently. Secondly, rhizomes coloured red on the outside show that sufficient reserve sugars have been built up. Thirdly, it is ideal when each crown has 3 short, fresh and young leaves. These green leaves ensure that the plant's chlorophyll is in place, so that it can maintain itself through photosynthesis. Fourthly, it is desirable that the top flower is about 8 mm in height before the actual rest starts. The top flower height indicates the development phase of the flower formation.

Ideally, the Sensation plants will have a total of about 1,200 chill units during the winter, according to the Hoogstraten cold model. The ideal temperature to take on cold is as close as possible to the ideal 1.39 °C mean daily temperature. The optimal number of chill units is almost never achieved, but this lack can be compensated by cyclical lighting during regrowth. The further the number of chill units finally achieved is from the desired level, the longer the plants need under lighting.

There is, however, a limit to the effect of lighting. When Sensation has only received less than 500 chill units, this is almost always at the expense of elongation and thus of growth, but also at the expense of fruit quality and fruit weight. A chill unit total of 700 is safer.

During winter rest, watering should be reduced to a level where the weight of the substrate trays stays at 75-80% of the saturation weight. This maintains strong roots and sufficient oxygen in the substrate.

Regrowth and lighting

Around the beginning of February, the Sonsation plants have usually received enough cold and the heating can be turned on again. For crops that have been harvested early in the autumn, the chill unit total may have been reached earlier. For crops harvested up to Christmas, it is better to have winter rest until mid-February.

During the first week that the heating is on again, the plants should be able to start up slowly. We recommend a day temperature of 12 °C and a night temperature of 8 °C for this. The cyclical lighting can be switched on again one week after the heating has started, from sunset to sunrise. Lighting is desired until the petioles are 20 to 25 cm long. Longer exposure can affect the shape of the fruits. The strawberries can become more elongated under excessive light.



Simultaneously with the start of lighting, the heating regime may be increased to 15 to 16 °C during the day. From then on, a mean daily temperature of 13.4 °C plus an increase of 0.2 °C per 100 Joules/cm² daily radiation sum are recommended.

Fruit quality

If the crop is full of fruits and the weather is dull, the plant's energy balance can be close to zero. This can lead to loss of quality and yield. In order to manage this situation, it is important, if possible, to not let the mean daily temperature increase to more than 13.4 °C plus an increase of 0.2 °C per 100 Joules/cm² of daily radiation sum. In the morning it is important to activate the plants by heating with open windows.

Large flushes of fruits per picking should be avoided. Picking fruits more frequently when plant load is high, is recommended to maintain fruit quality.

During the harvest period, the mean daily temperature must be at least 13.8 °C at all times, in order to maintain good fruit colouring.

It is important to keep a close eye on the drainage percentage during the afternoon, to avoid jeopardizing good strawberry growth. This is especially important during the spring harvest. The drainage percentage may seem OK for the entire day but the distribution over the day is at least equally important. Occurrence of fractured trusses is often related to this. Short-term water shortages result in reduced cell tension, which can cause sudden fractures in heavy trusses.



Early winter production

Early winter production is an option for realizing a Sonsation harvest period from December to January. To achieve this, planting can be done from late September to mid-October and assimilation lighting is required.

There is practical experience with a total amount of lighting of 15 mol/m²/day. Trials by PC Hoogstraten have shown that a high light intensity of 380 µmol provided by hybrid lighting (combination of SON-T and LED) gave the highest yield. An alternative 210 µmol setup achieved 90% of that performance and a 130 µmol setup achieved a yield level of 80%.

If the tray plants used for this purpose were cultivated in the previous year, it is important that they are not frozen until they have experienced at least 950 chill units (Hoogstraten model) or at least 700 cold hours < 7 °C on the tray field.

In view of the fact that this long plant storage period entails necessary risks, tests are also being conducted with the use of plant material that has undergone a short day treatment, which was cultivated in the same year.

Late winter production

The Sonsation variety also shows its good features when the high-point of the harvest falls in February and early March. This type of cultivation must, naturally, be carried out under assimilation lighting. Usually, these crops are planted from late November to 10 December.

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Since tray plants grown in a normal manner have accumulated too few cold hours by around the end of November to the beginning of December, there is now some experience with using shaded plant material, which was also cultivated in the same year. For this type of plant material, sufficient cold hours are also required before planting, otherwise the flower stalks will remain on the short side

Although the cultivation method with short day treated plants still raises many questions, a schedule for propagation and starting cultivation of short day treated plants looks like this:

- Runners taken around June 21, after which the well-grown plants are shaded from 7 August to 24 September for 14 hours per day to mimic a short day. Shading is usually done from 19:00 to 09:00.
- Around 20 October, enough flower buds formed on these plants and they are chilled at close to freezing until the planting date, but certainly not below freezing point. This allows the plants to accumulate around 1,000 cold hours.

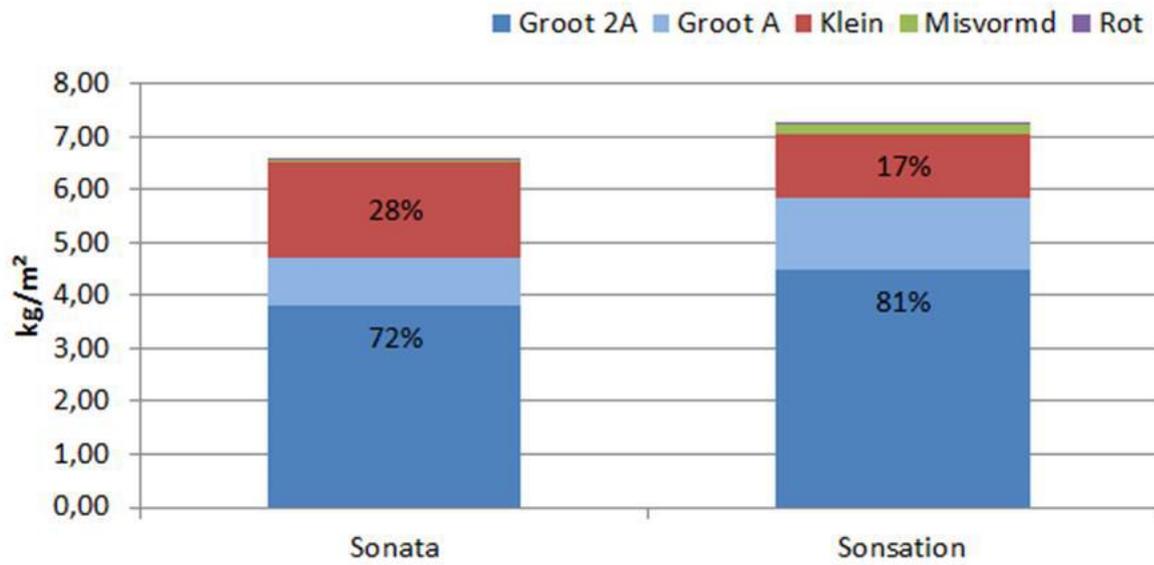


Figure 5: Production and sorting in cultivation with short day treated plant material. Source: PC Hoogstraten



Cultivation on table tops or in a “Hochstädter Damm” setup, under high or low tunnels.

Planting time, plant type and planting distance

A crop for summer production can be planted from the end of February, provided there is an opportunity to protect the plants from spring frosts. Tray plants with a spread potential of 6 to 7 trusses per plant are recommended. A+ plants are also successfully used for this cultivation method.

In addition to early planting, Sonsation can also be planted as a second crop. High tunnels and the Hochstädter Damm system, in particular, can both be considered suitable cultivation systems. In both systems the temperature of the substrate can be maintained at the same level better, which ensures better growth progress.

Plant no later than the first week of July for a second crop that can be harvested from the end of August. When planting later than the beginning of July, the last fruits will likely not be able to ripen.

Usually, planting density of 12 plants per linear meter of gutter is used for cultivation on outdoor racks with small tunnels or in high tunnels. This plant number applies to tray plants. When using A+ plants, 14 to 15 plants per linear meter are recommended. When using A++ plants, 12 plants are generally sufficient.

An alternative way to determine the planting distance is to divide the desired number of flowers per linear meter by the number of expected flowers per plant. An average number of flowers per truss is about 7.3 to 7.6 with Sonsation. With an average of 5 expected trusses per plant, you will get 38 flowers per plant. So, if you have a goal of 550 flowers per linear meter, you would end up with 14 plants per linear meter.

Fruit quality

It is important to keep a close eye on the drainage percentage during the afternoon, to avoid jeopardizing good strawberry growth. This is especially important during warm days. The drainage percentage may seem OK for the entire day but the distribution over the day is at least equally important.

This applies particularly to crops on racks with small tunnels over them, but also on racks in high tunnels, the substrate can cool down at night and become quite cold in the morning. When the sun suddenly breaks through mid-morning, the roots are not yet active enough, while the leaves start to transpire vigorously.

This results in reduced cell tension, which means that heavier trusses can suddenly fracture and buckle. This results in poorly grown and sour fruits.



Sonsation in Hochstädter Damm



Sonsation on table tops under rain cover

Sonsation fertilization and irrigation strategy

Knowledge of the exact nutritional needs of a new variety can help to achieve better growth and quality, as well as higher yields. A lot of research has been done for Elsanta and other existing varieties but relatively new varieties such as Sonsation probably have different requirements. To achieve an optimal schedule, it is recommended to have leaf and substrate samples analysed, to know whether to modify the nutrient mix or not.

- A good leaf/flower balance is important for optimal production and flavour.
- In a case where there are many flower clusters or more developed flowers during hibernation (flower truss more than 10-12 mm in height), more nitrogen may be required to stimulate leaf growth.

The table below shows the general effects of pH, EC and of the individual elements. And the specific needs for Sonsation are indicated here too.

	Advantage	Disadvantage	Sonsation
pH	In the low range, micronutrients and phosphorus are better available	Low Ph will limit the uptake of macronutrients	5.3 to 6.0
EC	Sufficient dissolved minerals are needed for plant growth	A high EC will result in leaf burning; low EC will cause slow growth	EC substrate 0.5- 0.6 EC sum start 2.6-2.7, flowering 2.8-2.9, harvest 3.0-3.3
N	Growth, leaf and stem mass, vegetative crop stage	Overly vegetative crop, late start of flower induction. High Nitrogen causes susceptibility for: powdery mildew, botrytis, aphids, spider mite, thrips.	Follow standard Elsanta scheme
P	A good root system, fertile flowers	Micronutrients are being limited in uptake, first Fe, then Zn and then Mn and Cu	No special needs
K	Effect on fruit colour, producing firm fruits. Stimulating growth. Sufficient K will avoid leaf burning in illuminated cultivations	Suppresses Ca in uptake = blossom end rot, excess will cause vegetative growth, limits Mg uptake	The need for K is larger compared to Sonata or Elsanta. Make K sufficient available for Sonsation. Start by lowering Ca and Mg at fruit size of 1cm. Mg to a certain level and further lower Ca, to go maximal in K ((7mmol/L) at full flowering stage. Potentially change a part of KNO ₃ by K ₂ SO ₄ to reduce N.
Ca	Avoiding blossom end rot, firm fruit skin/cells	Relatively few disadvantages, Mg and K are less available for uptake	Start with a slightly higher Ca scheme. From regrowth until start of fruit setting. Lower Ca a bit, when K is increased
Mg	Efficient NO ₃ conversion, healthy growth. Important for chlorophyll production	High Mg will result in lower K and Ca uptake	Make Mg more available at start and flowering phase. Lower in fruiting phase to make more K and Ca available.
S	Efficient NO ₃ conversion, healthy growth. Important for protein production	Acid soil conditions, pH will drop and an extreme uptake of Mn.	Direction could be to increase S. Watch out for your pH.
Cl	Healthy growth, Efficient NO ₃ conversion	Competition with NO ₃ in uptake, can lead to N deficiency	No special needs
Fe	Green leaf colour, without spots, avoiding yellow plants	High Fe results in lower Mn and Zn uptake	No special needs
Mn	Green leaf colour, without spots, low fungal susceptibility	High Mn results in lower Zn and Fe uptake. High Mn = calyx burning and fungi growth in the end	Sonsation needs more Mn, attention point for soil culture.
Zn	Green leaf colour, without spots, prevents leaf burning in illuminated cultivations	High Zn uptake results in lower Mn and Fe uptake	Sonsation needs more Zn, attention point for soil culture.
B	Stimulates Ca uptake, ensures firm fruit connections to the vine, limits yellow calyxes. Improved fruiting, less vine breaking	Toxic for plants, first leaf tip discolouration, followed by plant die off	Slightly higher B, attention point for soil culture.
Cu	Limits fungal susceptibility from inside the plants	Results in lower Fe and Zn uptake, produces firm crops, slower growth	Follow standard Elsanta scheme
Mo	Helps with good N conversion and healthy growth	No drawbacks known, but it does become toxic at a certain level.	No special requirements

Table 2: source NovaCropControl

Fertilization on substrate

The status of fertilizers and nutrients in a substrate cultivation must be permanently monitored and modified by the crop advisers. There is a standard recipe for each phase below. Using this standard nutrient recipe combined with the analyses of the source, drain water, substrate and plant juice analysis, you can compile a grower-specific feeding schedule.

The following is a standard feeding scheme for Sonsation on substrate:

Phase	Remarks	SOM EC	NH4	K	Ca	Mg	NO3	PO4-P	SO4-S
Start		2.6-2.7	1	5	4.25	1.5	12	1	1.5
Flowering	From the first flowering phase	2.8-2.9	0	6	3.75	1.5	12	1	1.5
Production	From 1 cm fruit size	3.0-3.3	0	7	3.25	1.25	12	1	1.5

Phase	Remarks	SOM EC	Fe	Mn	Zn	B	Cu	Mo	Cl max.	Na max.
Start		2.6-2.7	35	30	12	20	1	0.5	1.5	0.5
Flowering	From the first flowering phase	2.8-2.9	35	30	8	20	1	0.5	1.5	0.5
Production	From 1 cm fruit size	3.0-3.3	35	30	8	20	1	0.5	0	0.5

Guideline EC:

	First week	Growth phase	Flowering phase	Harvest phase
Dripping	-	1.2 - 1.3	1.3 - 1.4	1.4 - 1.5
Drain	-	1.3 - 1.4	1.5 - 1.6	1.6 - 1.8

When the drain EC rises quickly, it is good to first check whether there is insufficient water. A fully grown crop of Sonsation usually requires more water than one with the Sonata variety.

Irrigation on substrate

It is important to keep a close eye on the drainage percentage during the day, to avoid jeopardizing good strawberry growth. The drainage percentage may seem OK for the entire day but the distribution over the day is at least equally important. Occurrence of fractured trusses is often related to this. Short-term water shortages result in reduced cell tension, which can cause sudden fractures in heavy trusses. Therefore, watering based on radiation sum or weight loss is recommended.

Faltering water absorption can also occur when the substrate is rather cold in the morning and evaporation increases rapidly because of a sudden strong increase in radiation. This phenomenon is a particularly important factor in cultivation on table tops in tunnels and in the open ground. Correct irrigation start and stop times are also important. If there is already drain water flowing out after the first watering, the start time is too early. If drip-irrigation during the day runs too long, the substrate can go into the night excessively wet, causing roots to die due to lack of oxygen.

Desired drain percentages per day:

	First week	Growth phase	Flowering phase	Harvest phase
An active crop	moist	10-15%	15-25%	25-30%
A not very active crop	moist	5-10%	10-15%	10-20%

Soil cultivation

There are now good experiences with soil Sonsation cultivation, in the open air or under high, portable or low tunnels. The plant density in these crops is predominantly 3.6 plants per m². This yields a good 4 kg per m² with a spring planting under portable tunnels and over 3 kg per m² with spring planting in the open air.

Sonsation's good pollen quality ensures that this variety has negligible trouble with bad pollination in the spring due to cold nights or rainy periods. After a few days of sprinkler irrigation against night frost, the flowers that were open at the time turned out to be well fertilized and developed into well-formed strawberries.

Fertilization for growing waiting bed plants and normal over-winter cultivation

For propagation of waiting bed plants, you can follow the same cultivation and fertilization strategy as for other June bearers, with a planting time around the beginning of August. The same applies to the autumn part of the cultivation where the plants overwinter in the field. Fresh plants or plug plants can be used as plant material.

Sonsation plants overwintered in soil can also be treated in the same way in the spring as other June bearers, subject to the understanding that Sonsation needs sufficient magnesium during growth and has a higher potassium requirement, starting from flowering. Extra attention to boron, manganese and zinc in the soil is also required with open ground crops.

If there are shortages of potash and trace elements, the crop can develop significant symptoms of chlorosis during the harvest. Chlorosis phenomena certainly occur regularly where this is combined with an excessive pH in the irrigation water or the soil.

Fertilization of Sonsation in open ground cultivation, with spring planting around 1 April

The underlying principle is that the basic nutritional status of the soil is maintained.

A pH of around 5.5 should be the goal, and in addition to sufficient main elements, it is also important that there is a sufficient base of trace elements present. Boron, zinc and manganese, in particular, must be sufficiently available.

The mineralization of nitrogen is always an uncertain factor during cultivation. Therefore, it may be necessary to deviate from the basic advice when the N-min indicates this. The basic advice can be followed with an N-min from 40 to N-min 80. When the N-min is less than 40, the N-application can be slightly higher. When the N-min is higher than 80, the N-application can be somewhat lower. But be careful to ensure that the supply of the other elements is not insufficient.

Sonsation requires sufficient magnesium during growth and more potassium than, for example, Elsanta, especially from the beginning of flowering to the end of the harvest.

A full open ground cultivation of Sonsation, which has been planted with waiting bed plants or A+ plants in the spring around 1 April, normally requires the following supply of fertilizers, in addition to the available nutrients in the soil (with a total cultivation period of 14 weeks):

Note: when planting earlier in the spring, the quantities below must be spread over a longer period.

This advice is based on in-line fertilization, using T-tape.

- Seven Days after planting, 40 kg MAP (mono-ammonium phosphate)
- From 10 days after planting, 50 kg of calcium nitrate per hectare per week (4 times in total).
- From 14 days after planting, 50 kg of magnesium sulphate per hectare every 14 days (total 4 times).
- From the beginning of flowering, 50 kg of potassium nitrate per hectare, weekly until the beginning of harvest (a total of 4 times).
- During harvest, 20 kg potassium sulphate per hectare per week (total 2 times), for firmer fruits.

If you follow this schedule you will apply the following amounts of minerals during a crop cultivation per hectare:

62 kg N

10 kg P

20 kg Mg

112 kg K.

When using a fixed controlled release fertilizer, it can be applied immediately before planting, but this requires a good drenching after planting to avoid the risk of excessive salt concentration around the roots due to broken granules.

If you use other fertilizers than those described in the example above, the desired amounts can be converted for this. It is important that the quantities of elements mentioned above are available to the plants in the stated periods (start of cultivation, during flowering and during harvest).

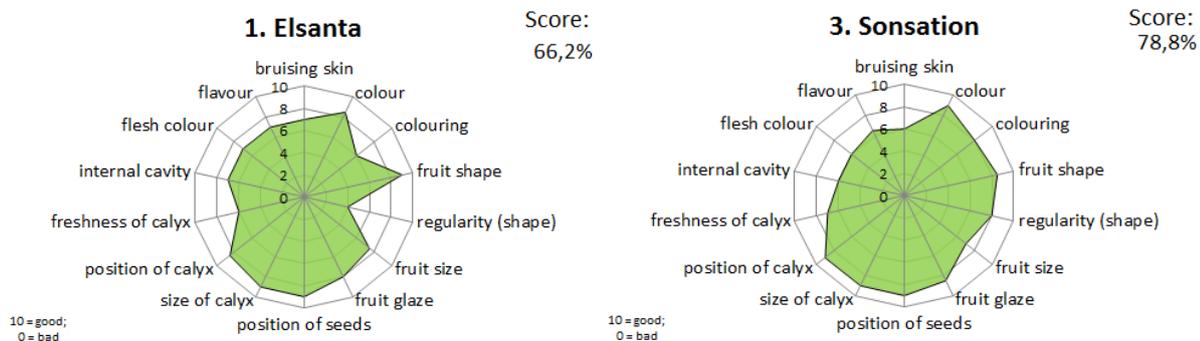


Figure 6: Fruit quality in open ground cultivation. Source: PC Hoogstraten

Disease and pest prevention

Phytophthora

Sonsation has tolerance to phytophthora cactorum. A comparison test with the Sonata variety at PC Hoogstraten demonstrated Sonsation's reduced susceptibility. We would like to add that Sonsation is not actually insusceptible to phytophthora cactorum. And an infestation with phytophthora fragariae cannot be excluded.

Mildew

Mildew infection is possible. But Sonsation is less prone to mildew than Elsanta and Sonata. So, be vigilant about the risk of infection and carry out preventive treatments several times. Observe the fruit every day and start curative control as soon as possible after the first infestation. In a greenhouse, you can use sulphur evaporators for 4 to 6 hours every night, starting 10 days after planting.

Mucor

Sometimes Sonsation is affected by Mucor. The reason is often excessive planting density combined with slow drying of the crop in the morning. A dense layer of unripe and ripe strawberries can also increase the chance of Mucor. You should also pick Sonsation strawberries carefully, without damaging the unripe fruits. Maintain good hygiene by consistently removing infected fruits. Activating the crop in the morning by using a minimum heating tube and a specific minimum vent setting can prevent or limit the problem. In addition to that, it is desirable to remove any fruit-covering leaves, to ensure a better microclimate around the fruits.

Consumer opinion of the fruit quality

Innovative Fresh compared Sonsation's fruit quality compared to that of Sonata. This company continuously analyses the quality of fruit and vegetables in the supermarkets. Their unique approach ensures that the factors they test exactly match consumer experiences. In the 2018 growing season, Sonsation scored the same as Sonata. The fact that plant health and sorting are both better with Sonsation makes this variety a safe choice for both grower and consumer.

	Variety	Appearance	Diameter	White shoulders	Wet pressure spots	Dry pressure spots	Flavour	Firmness	Brix	Acidity	Sweetness/Acidity	Final score
Average	Sonata	7.2	35	1	4	21	7.5	385	7.7	0.8	9.8	7.4
	Sonsation	7.3	37	1	5	20	7.4	426	8.1	0.7	10.9	7.4