

# Improving plant quality and economy for a more sustainable and efficient berry production

**Strawberry and raspberry trials**

**Acronym: QualityBerry**

**Contract number: NOR/POLNOR/QualityBerry/0014/2019-00**

**Agnieszka Masny, National Institute of Horticultural Research, Skierniewice**



## **WP1. Environmental effects on flower and dormancy initiation and breaking of dormancy in *Rubus* and *Ribes* species** (WP Leader Anita Sønsteby)

### **Task 1.3. Dormancy breaking of established cultivars and advanced selections of *Rubus* and *Ribes* (NIBIO and INHORT)**

#### **Raspberry**

Different dormancy breaking temperatures (-5, 0, 5°C) for 7, 14 and 21 weeks

Shoot/canes collection and storage beginning: 9<sup>th</sup> Feb. 2021 / 10<sup>th</sup> Jan. 2022

**Assessment beginning** in 2021: 31<sup>th</sup> March; 19<sup>th</sup> May; 7<sup>th</sup> July

**Assessment beginning** in 2022: 28<sup>th</sup> February; 19<sup>th</sup> April; 6<sup>th</sup> June.

**Cultivars:** Tulameen, Vetten, Willamette, Schönnemann, Glen Ample, Przehyba, Polana + in 2022: Sokolica, Canby and Polka

#### **Assessment:**

- recording of the number of bursting buds every two days, starting from the date they were taken out of the cold store;
- bud dissection and assessment of the stages of bud development directly after the end of the storage (+ in 2022 directly after taking the shoots from the field)

## WP1. Environmental effects on flower and dormancy initiation and breaking of dormancy in *Rubus* and *Ribes* species (WP Leader Anita Sønsteby)

**Table: The number of days of bud break stored in cold storage after they have been transferred to the greenhouse**

Cultivar	2021									2022								
	7 weeks			14 weeks			21 weeks			7 weeks			14 weeks			21 weeks		
	-5°C	0°C	5°C	-5°C	0°C	5°C	-5°C	0°C	5°C	-5°C	0°C	5°C	-5°C	0°C	5°C	-5°C	0°C	5°C
Przehyba	2-16	2-16	2-16	5-14	2-14	2-14	-	2-9	-	7-11	2-11	7-11	4	2-4	2-4	-	2	2
Schonemann	2-8	2	2-4	-	2-8	2	-	4-8	-	9	7	7-14	4	-	4	-	2-4	2-4
Willamette	2-6	2-12	2-12	-	2-8	2-14	-	2-8	2	-	7-11	-	4	4	4	-	2	2-4
Glen Ample	-	-	2-4	-	-	2-8	-	-	-	-	7-14	7-14	4	4	4	-	2-4	2-4
Tulameen	2-10	2-8	2-6	-	2-6	-	-	-	-	-	7-14	7-11	-	4	-	-	2-4	2-4
Veten	2-12	-	2-6	-	2	-	-	2	2	16	-	7-14	4	4	4	-	2-4	2-4
Polana	2-8	2-16	2-6	4-8	2-12	2-8	-	-	-	7-11	2	11	2-4	2-4	2-4	-	2-4	2-4
Sokolica										7	7	7-11	4	4	-	-	2-4	2-4
Canby										7	7-14	7-14	4	2-4	2-4	-	2-4	2-4
Polka										7-9	2-16	7-14	2-4	2-4	2	2-4	2-4	-

Buds – transferred to the greenhouse after 7 weeks of storage took the longest time to reach the breakage phase (differences for individual genotypes).

Buds stored for a period of 21 weeks burst usually within 2-4 days after being transferred to the greenhouse; numerous buds had not start developing at all.

A large number of buds stored at -5°C did not develop after being transferred to the greenhouse.

# WP1. Environmental effects on flower and dormancy initiation and breaking of dormancy in *Rubus* and *Ribes* species (WP Leader Anita Sønsteby)

## Task 1.3. Dormancy breaking of established cultivars and advanced selections of *Rubus* and *Ribes* (NIBIO and INHORT)

### Raspberry

A bud dissection and evaluation of the development stage done directly after the end of the storage. After 7 weeks of storage, the buds were at stage 2-3, regardless of temperature. After 14 weeks of storage - large differences in bud development: from stage 1 (Willamette at +5°C) to stage 5 (Polana, Vetten, 0°C). After 21 weeks of storage – bud development from stage 2 (Schönneeman, +5°C) to stage 5-6 (Polana at -5°C, Willamette at +5°C, 0°C). After 21 weeks, many buds were dried up, and they fell apart during isolation.

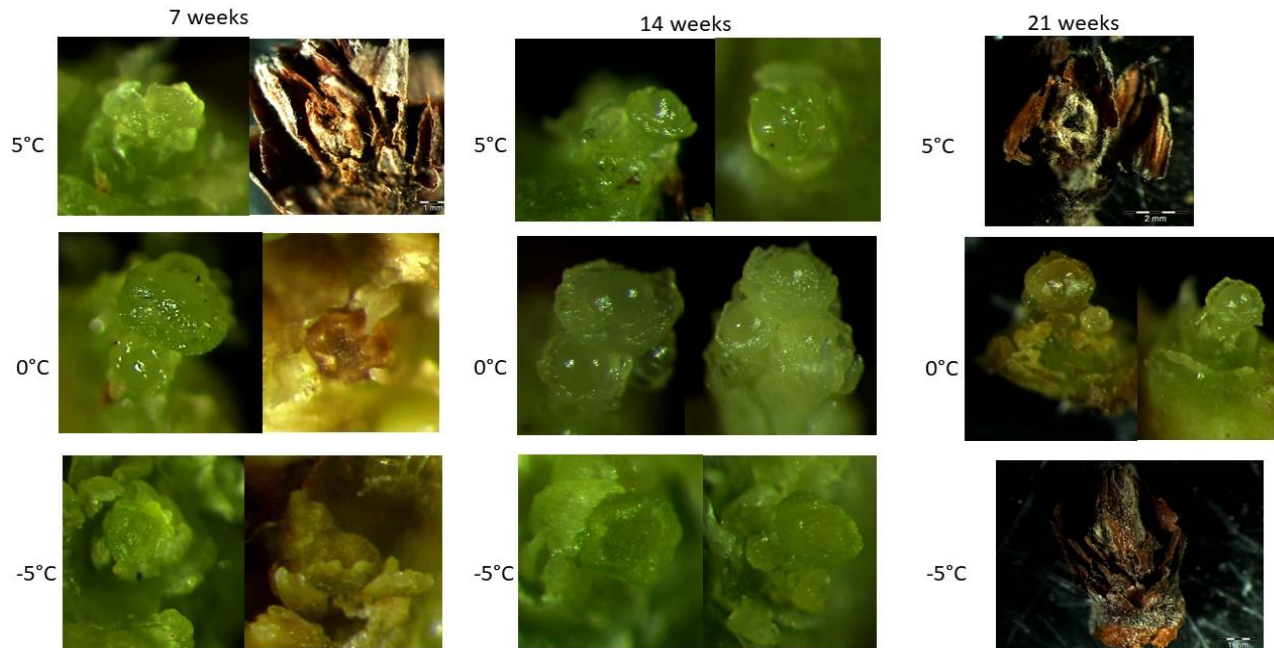


Fig 1. Dormancy breaking in Przehyba

## Task 1.4. Phenotyping overall plant performance (INHORT and NIBIO)

### Raspberry cultivars:

Przehyba, Schönemann, Willamette, Glen Ample, Tulameen, Veten, Polana + in 2022: Heritage, Poemat, Sokolica, Canby, Polka, Laszka, Ninni, Duo

### **Assessment:**

- date of bud breaking,
- beginning of flowering,
- level of infestation by pests and diseases,
- tolerance to abiotic stresses (heat, frost, drought, chlorosis),
- height of old shoots,
- length of growth of young shoots (weekly from the beginning of August),
- yield and fruit weight,
- fruit quality (fruit color and its intensity and homogeneity, brightness, bloom, predominant fruit shape and its homogeneity, size of the drupelet, firmness)

## Task 1.4. Phenotyping overall plant performance (INHORT and NIBIO)

	2021	2022
Beginning of the vegetative bud breaking	from 81.7 days (March 23-24) for the cultivar Polana to 89.5 days (March 30-31) for Tulameen.	from 66.0 days (March 7) for Polana, Sokolica, Canby, Polka, Laszka to 78,7 days for Willamette, Tulameen and 79,6 days (March 20-21) for Glen Ample.
Beginning of flowering	147.1 days for Polana (May 27) to 152.5 days for Schönemann and Vetén (June 1).	139 days for Canby (May 19) to 145 days for Schönemann (May 26).
Fruit harvest	From July 5 <sup>th</sup> (Przehyba) until August 25 <sup>th</sup> (Glen Ample, Vetén and Polana)	From July 1 <sup>st</sup> (Przehyba, Laszka) until ??? (harvest of Polka, Polana, Heritage in progress )
Productivity	The highest – Polana, the lowest - Schönemann	The highest – Polana, the lowest – Ninni and Duo (young shrubs)
Fruit size	The largest - Tulameen and Przehyba; the smallest - Polana	The largest - Glen Ample, Polka and Przehyba; the smallest – Willamette and Sokolica
Fruit color	The darkest – Polana; the brightest - Schönemann and Vetén	The darkest – Polana; the brightest - Tulameen
growth of young shoots	until 21 <sup>st</sup> September; the longest shoots (over 120 cm) - Tulameen and Willamette , the shortest (below 70 cm) - Polana and Glen Ample	Currently under evaluation



## WP3. Development and optimization of innovative cultivation techniques for season extension, quality improvement and safety of berries. (WP Leader Tomasz Woźnicki)

### Task 3.1. Optimization of soilless growing methods of strawberry under cover using different growing media and plant types

**Strawberry:** Grandarosa, Markat, Panvik, Florence,

**Substrates:** peat substrate, coconut substrate, wood fiber and mixture of peat substrate and wood fiber 50:50

**Two types of frigo plants:** potted and bare root

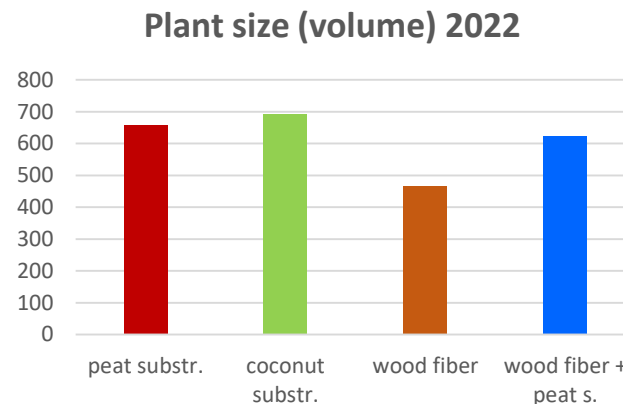
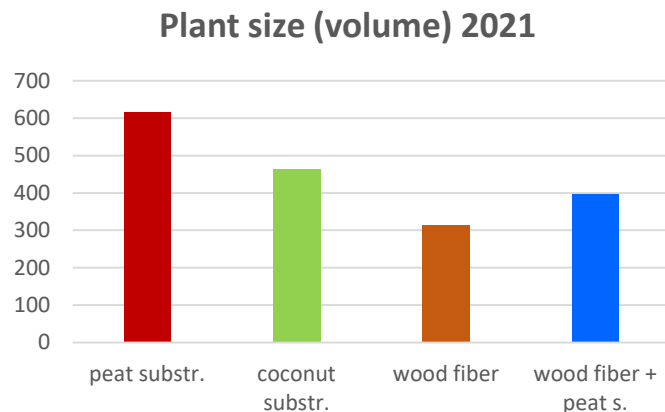
**Soilless cultivation:** pots at gutters in the tunnel and under plastic canopies

**Assessment:** plant growth vigour, flowering intensity, fruit yield and its quality, disease severity

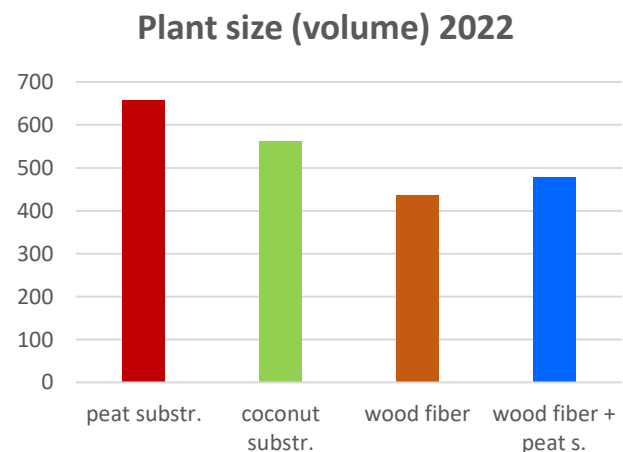
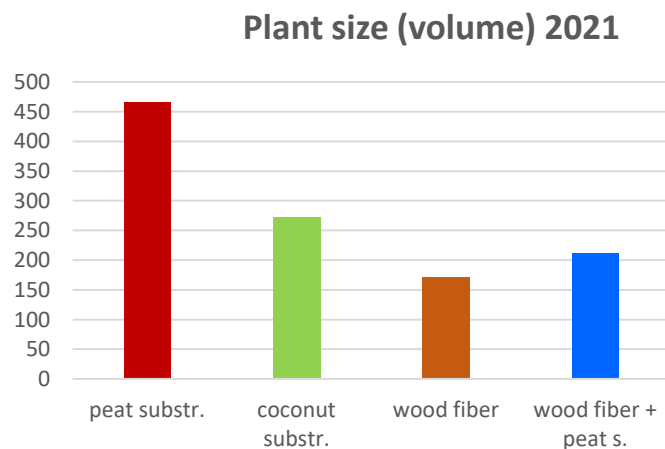


## Task 3.1. Optimization of soilless growing methods of strawberry under cover using different growing media and plant types

### Tunnel



### Canopies

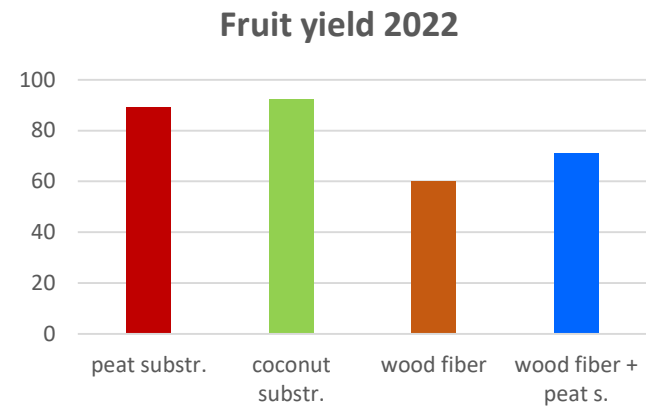
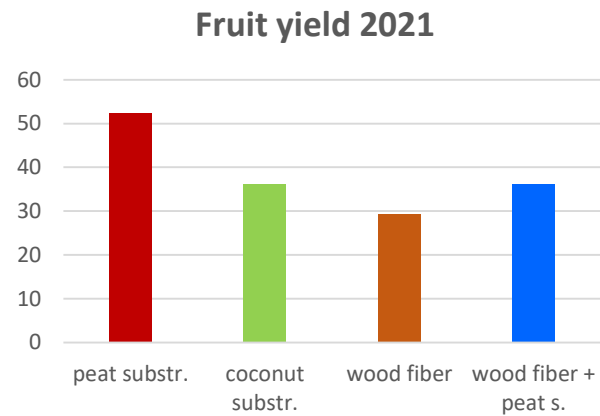


**Plants of both types in peat substrate - the strongest growth vigour.**

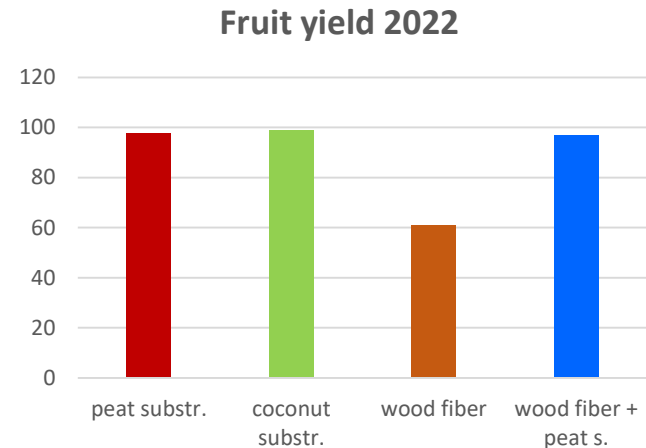
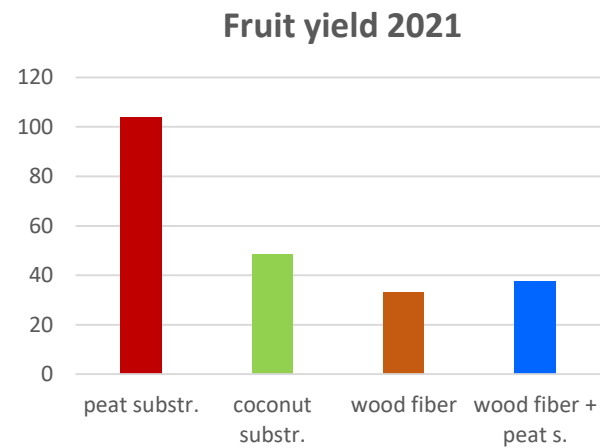


# Task 3.1. Optimization of soilless growing methods of strawberry under cover using different growing media and plant types

## Tunnel



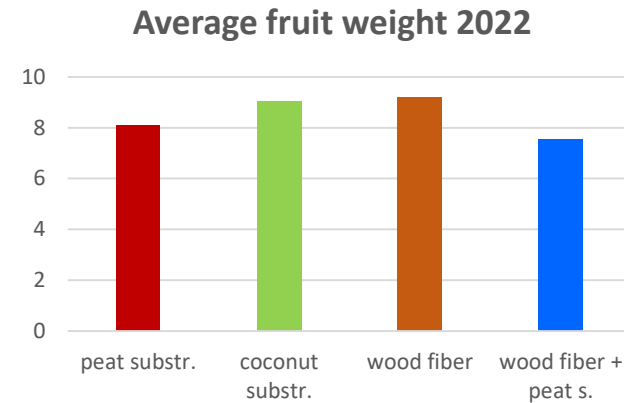
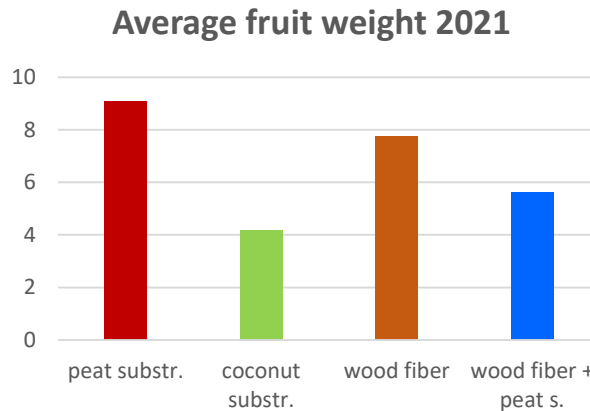
## Canopies



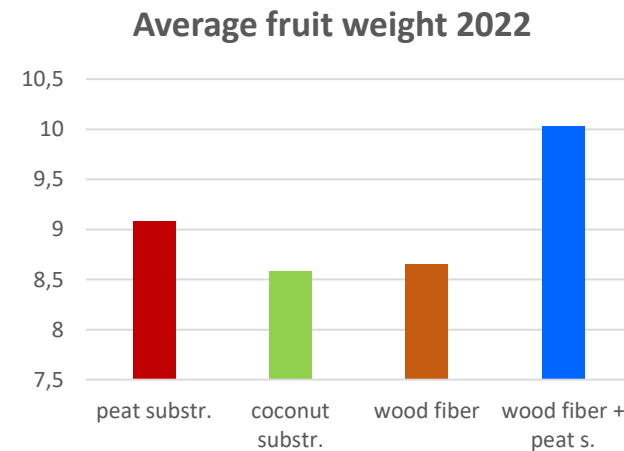
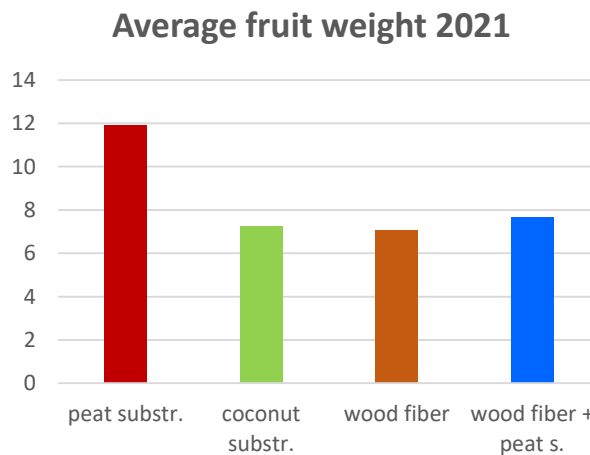
Plants of both types in peat substrate - the highest yield.

## Task 3.1. Optimization of soilless growing methods of strawberry under cover using different growing media and plant types

### Tunnel



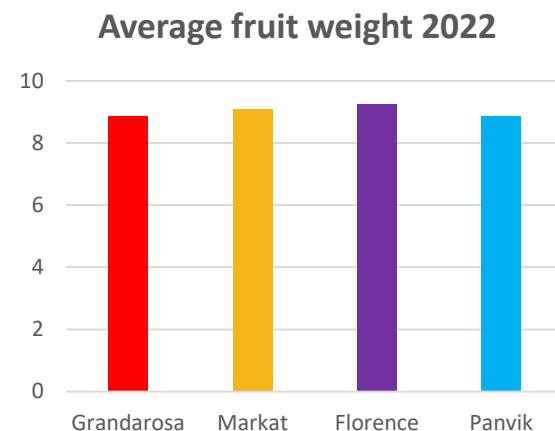
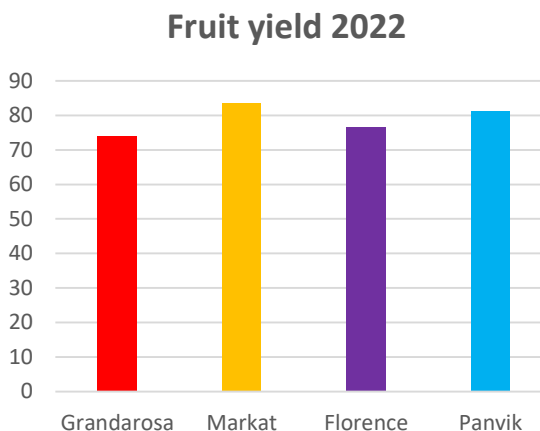
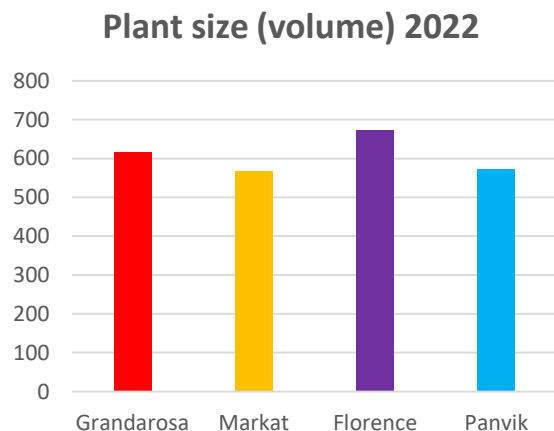
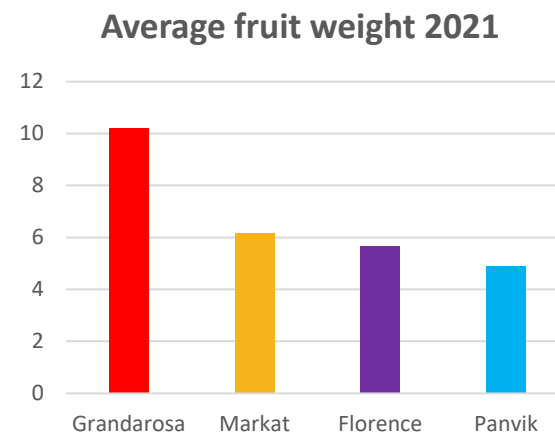
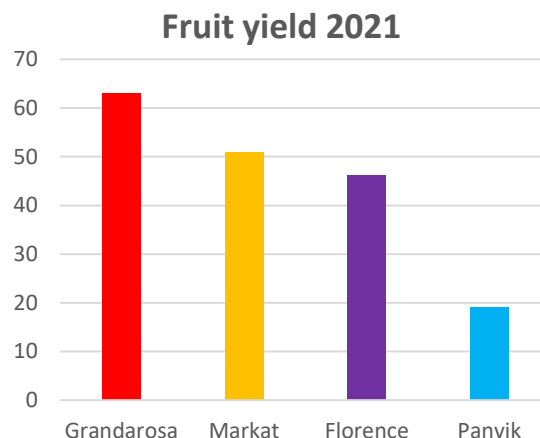
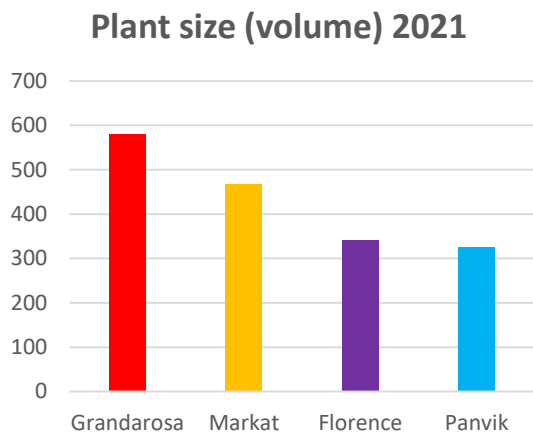
### Canopies



Differences depending on the growing conditions and season.

## Task 3.1. Optimization of soilless growing methods of strawberry under cover using different growing media and plant types

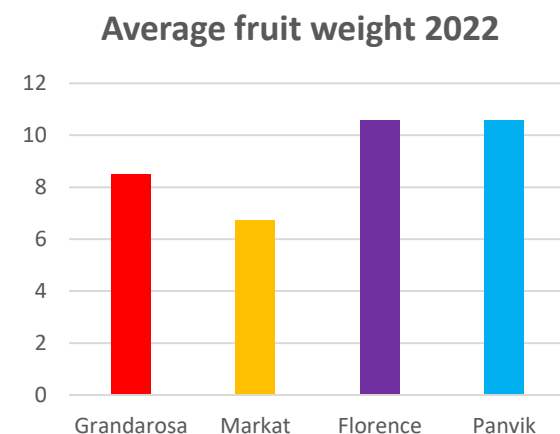
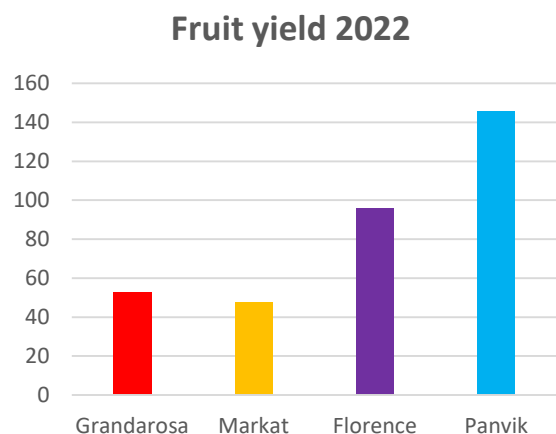
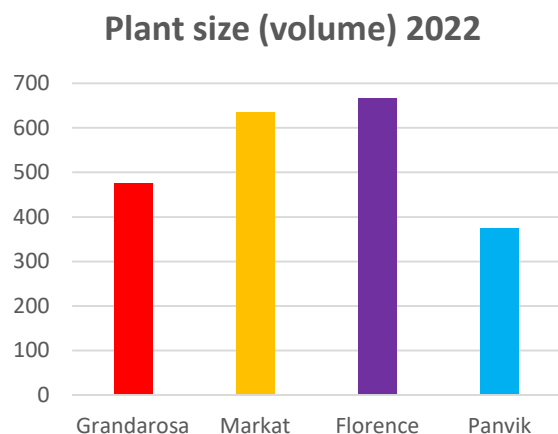
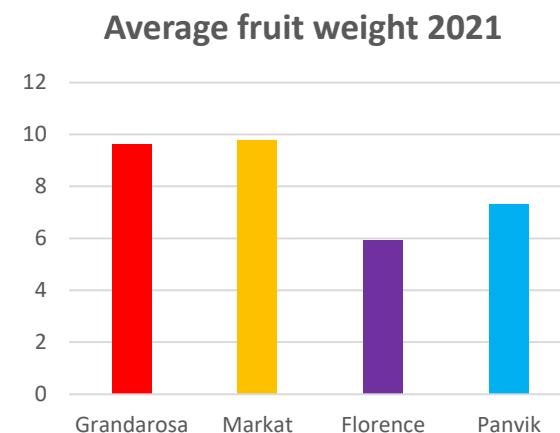
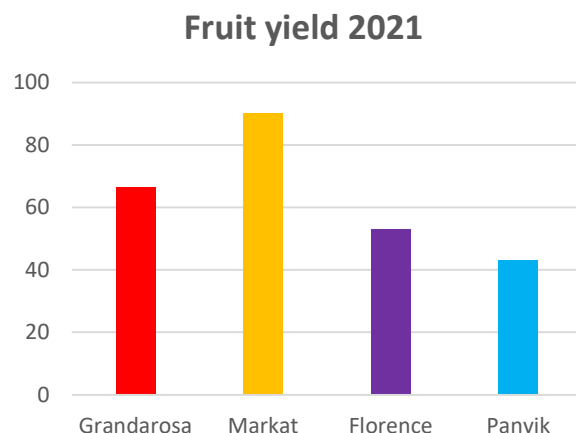
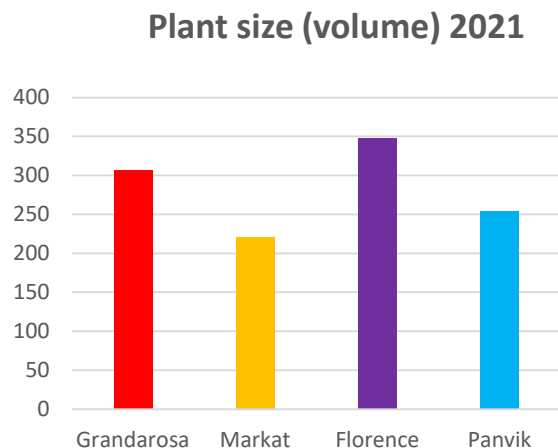
### Tunnel



**The best suitability of Grandarosa for cultivation in the tunnel (the highest yield and average fruit weight, their attractiveness, shape, gloss, taste and firmness) in 2021; comparable suitability of all cultivars tested in 2022.**

## Task 3.1. Optimization of soilless growing methods of strawberry under cover using different growing media and plant types

### Canopies



**The best in cultivation under plastic canopies in 2021 - Markat (highest yield, large fruit), while in 2022 Panvik (highest yield, large fruit).**

### Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

**Strawberry:** Grandarosa, Markat, Florence, San Andreas and Albion

**Biostimulants:** Tytanit (titanium), SuperFifty Algae 500 SL (extract from *Ascophyllum nodosum* + K<sub>2</sub>O)

**Macro- and micronutrients:** Alkalin KB+Si (nitrogen-potassium-boron-silicon fertilizer), AminoUltra Cu (contains copper, nitrogen and glycine), Optycal (contains oxide calcium, boron, copper, iron, manganese, molybdenum and zinc) and ZumSil (growth stimulator containing orthosilicic acid)

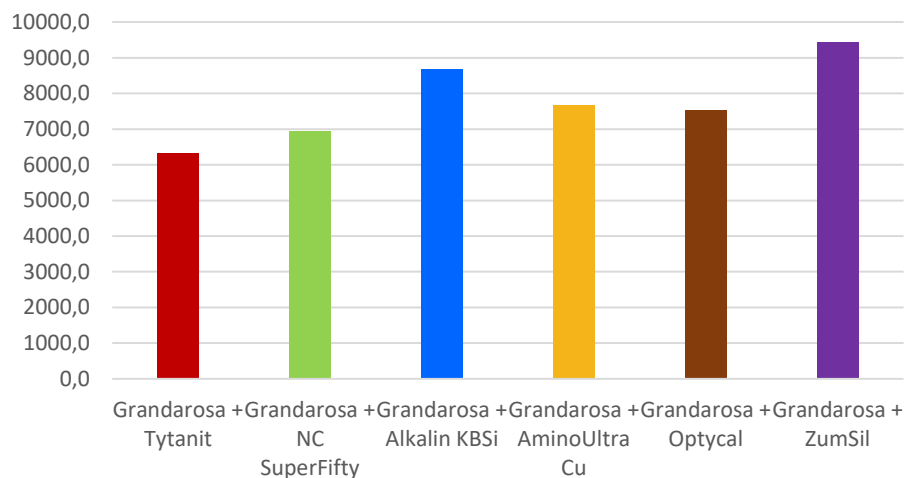
#### Assessment:

- plant growth vigour (plant height and diameter),
- flowering intensity (number of inflorescences and flowers),
- fruit yield (total, marketable, unmarketable, misshapen and rotten fruits)
- fruit quality (weight, attractiveness, skin colour, glossiness, taste, firmness, content of sugars, acids, phenols).

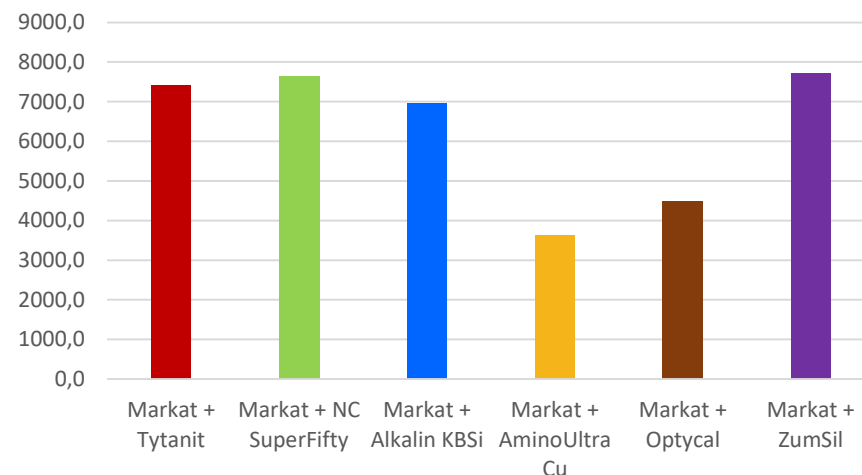


## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

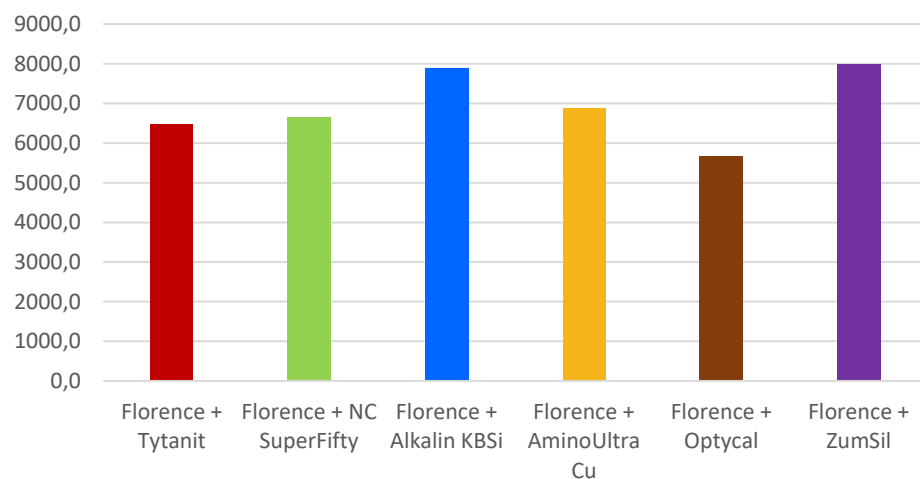
**Total yield 2022 - GRANDAROSA**



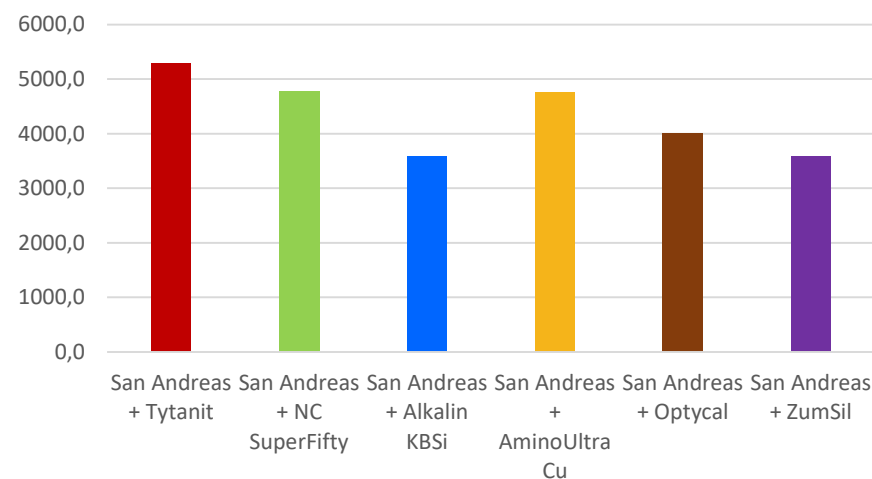
**Total yield 2022 - MARKAT**



**Total yield 2022 - FLORENCE**



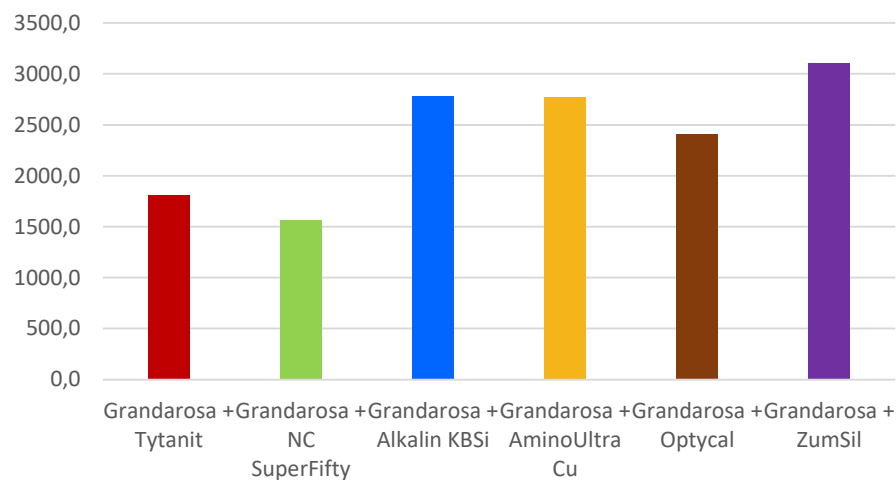
**Total yield 2022 – SAN ANDREAS**



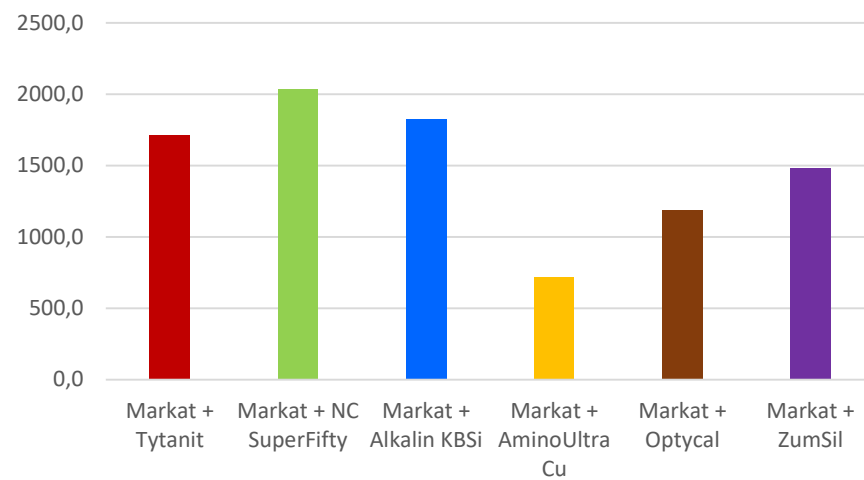


## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

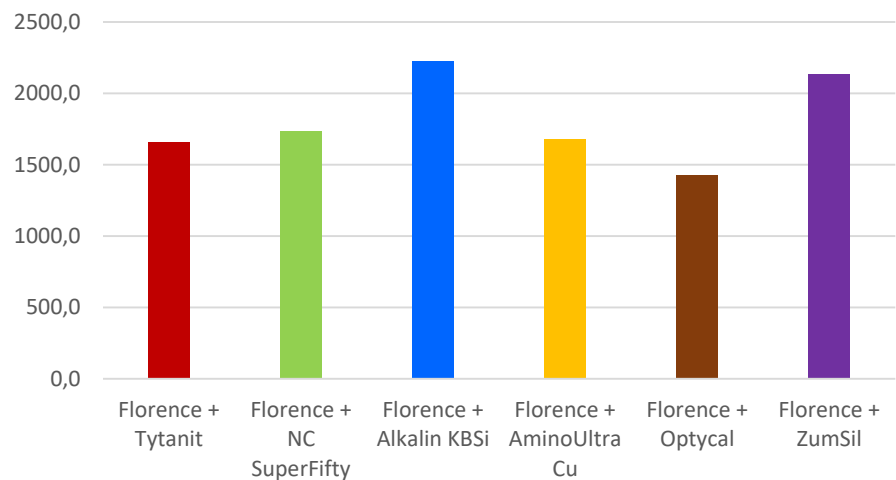
### Marketable yield 2022 - GRANDAROSA



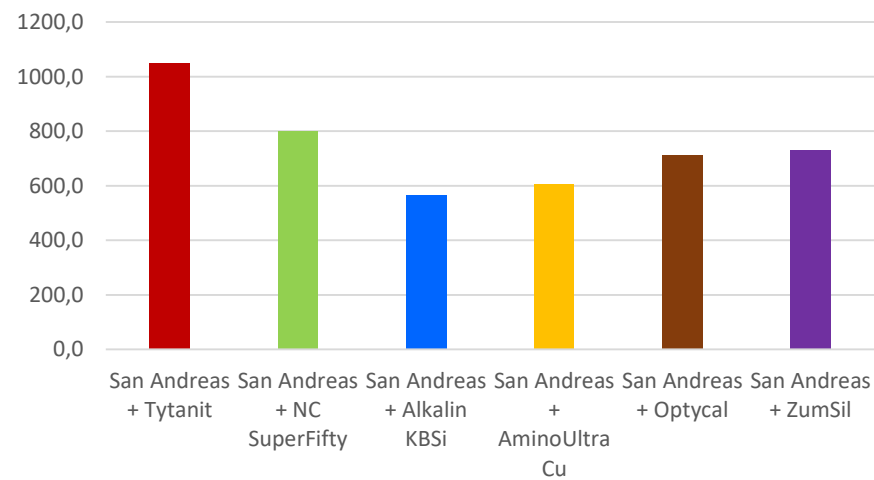
### Marketable yield 2022 - MARKAT



### Marketable yield 2022 - FLORENCE

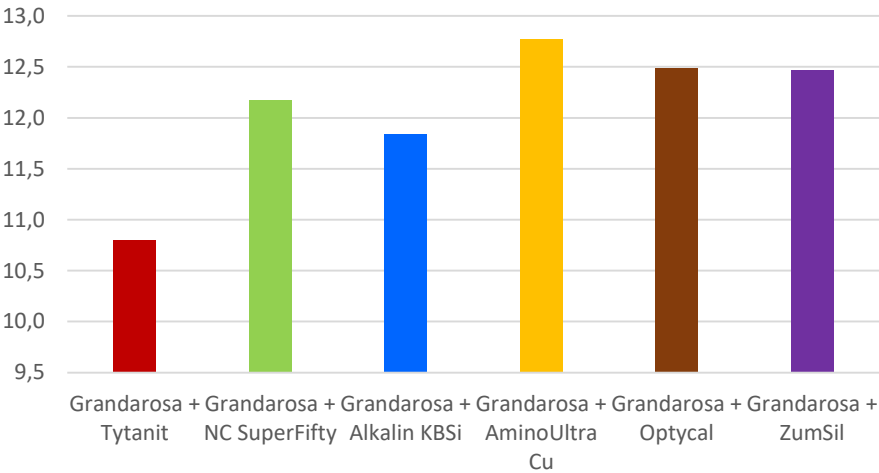


### Marketable yield 2022 – SAN ANDREAS

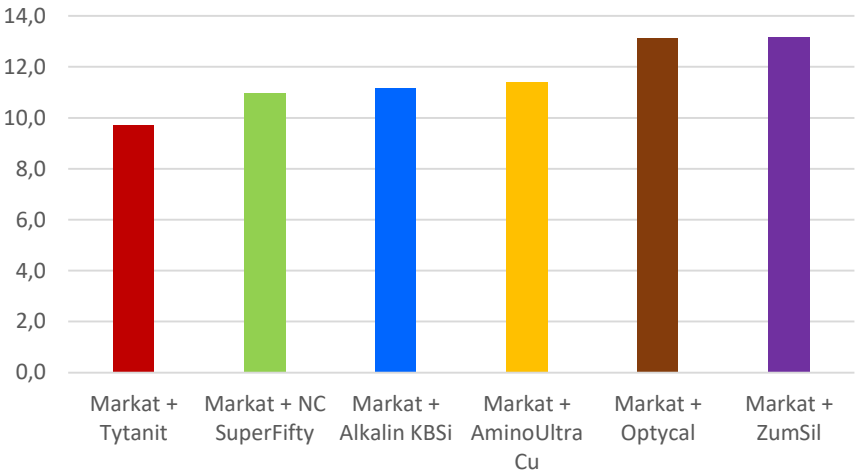


# Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

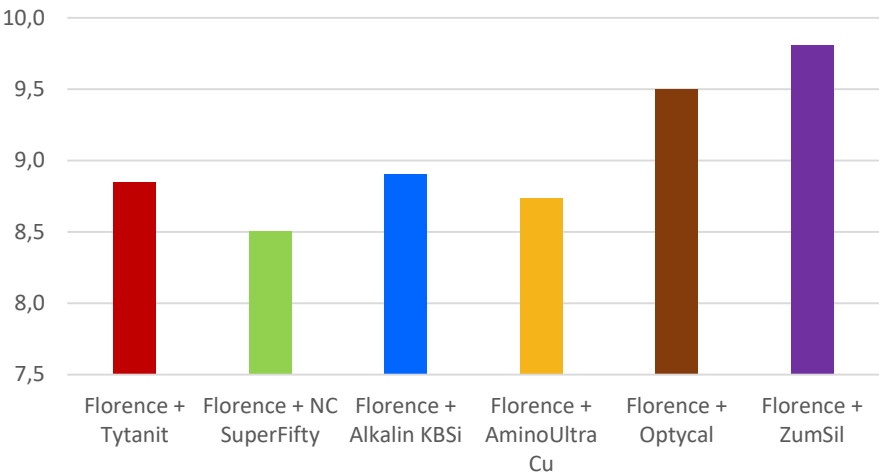
Average fruit weight 2022 - GRANDAROSA



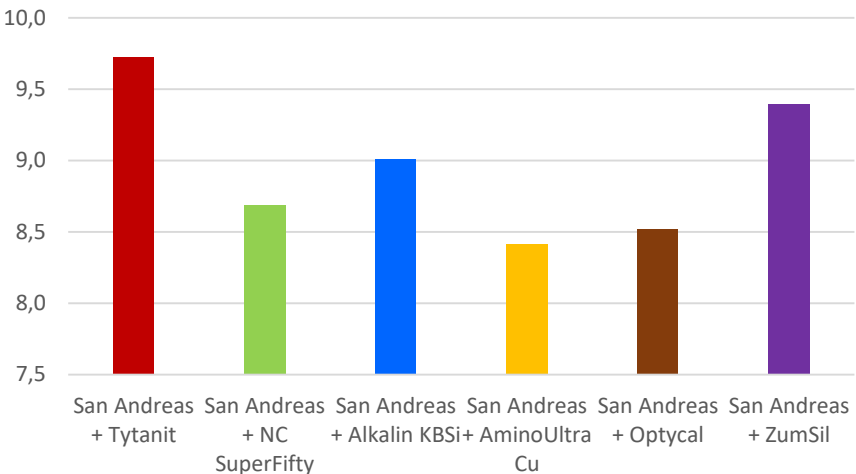
Average fruit weight 2022 - MARKAT



Average fruit weight 2022 - FLORENCE

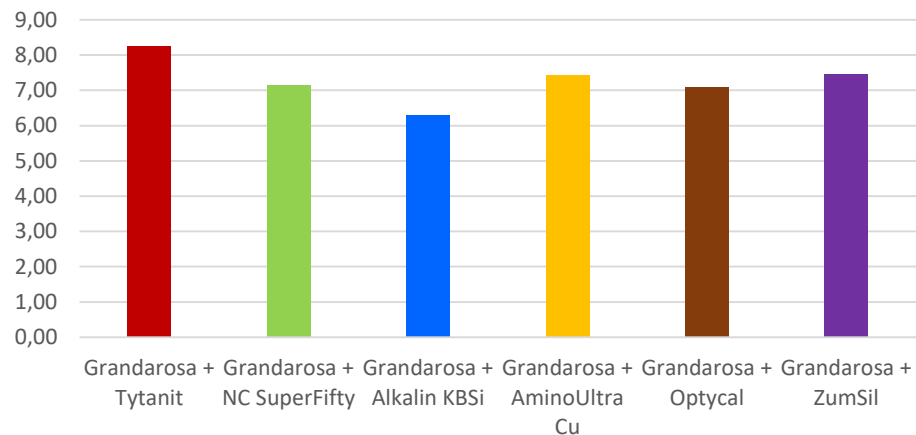


Average fruit weight 2022 – SAN ANDREAS

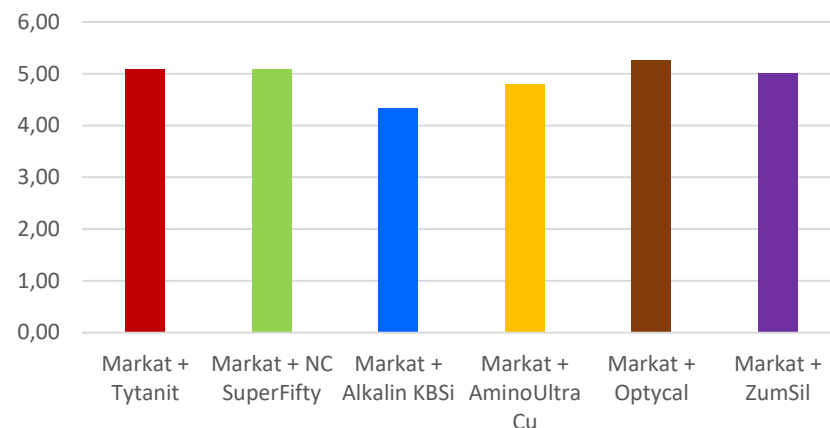


## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

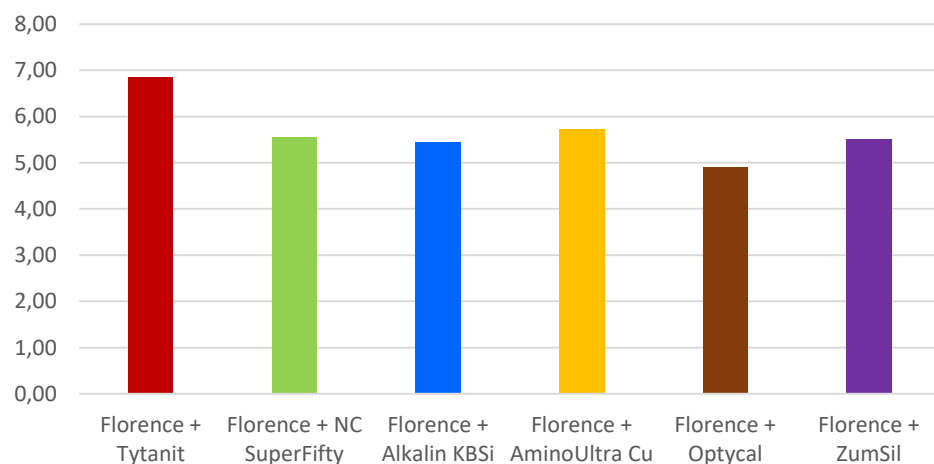
### Fruit firmness 2022 - GRANDAROSA



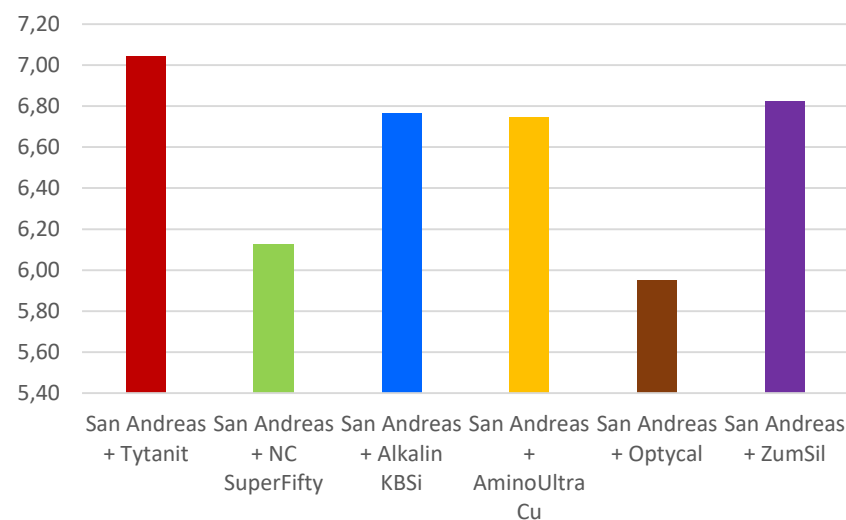
### Fruit firmness 2022 - MARKAT



### Fruit firmness 2022 - FLORENCE



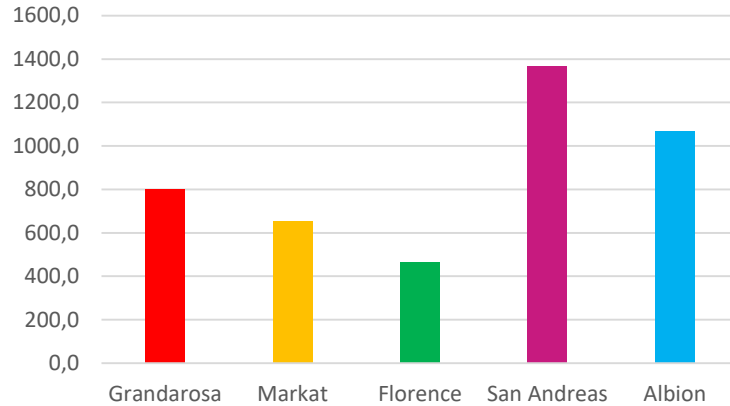
### Fruit firmness 2022 - SAN ANDREAS



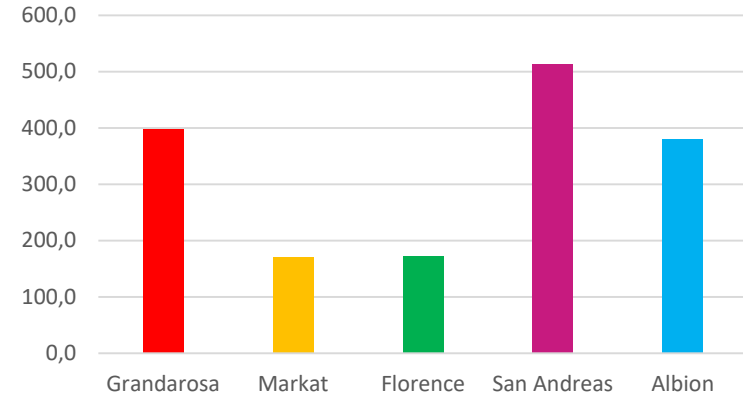
## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

### Means for cultivars

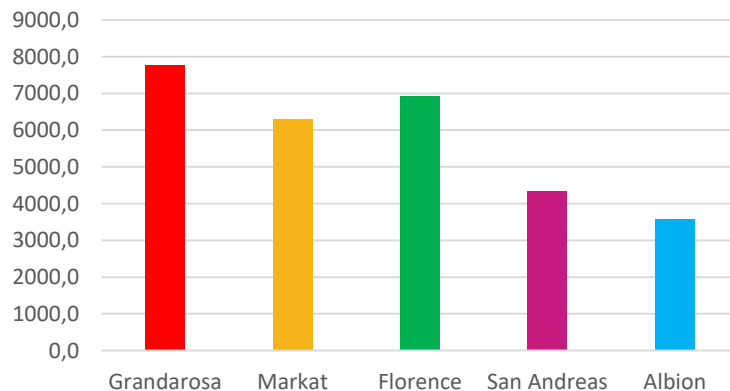
Total yield 2021



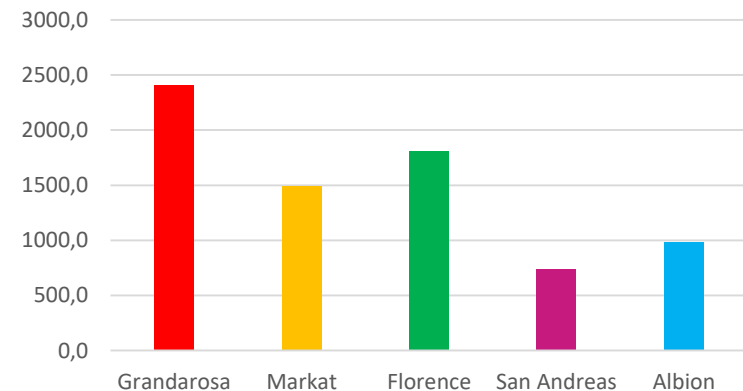
Marketable yield 2021



Total yield 2022



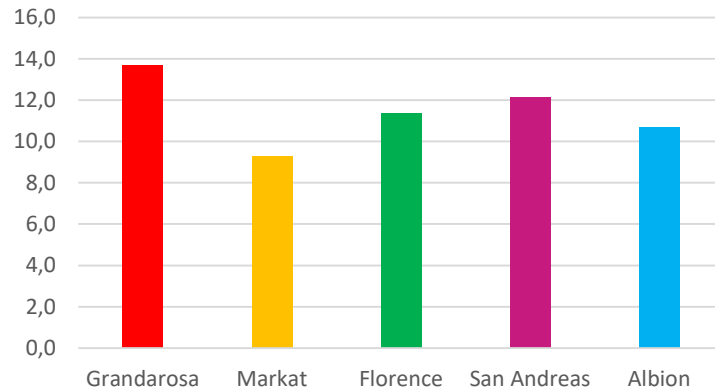
Marketable yield 2022



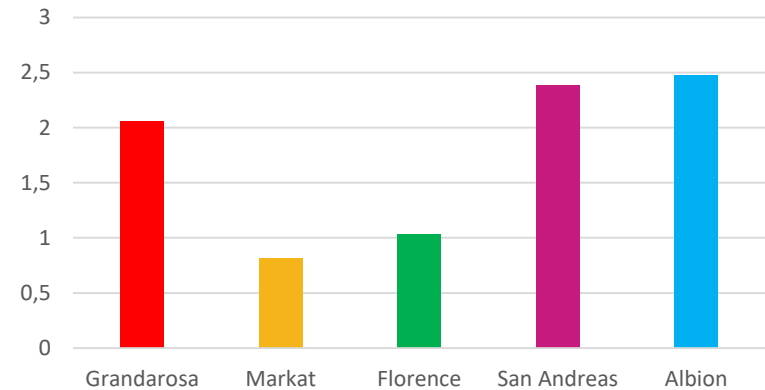
## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

### Means for cultivars

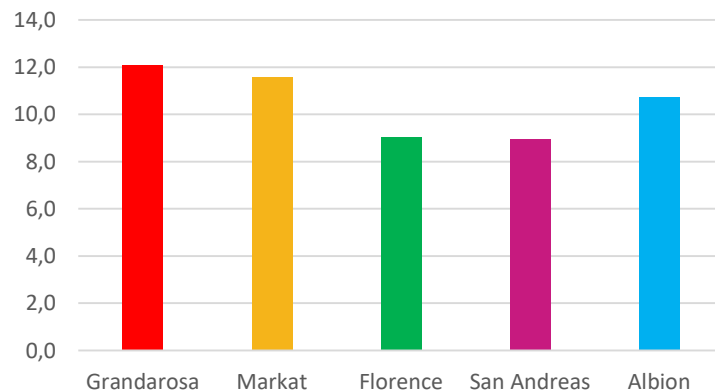
Average fruit weight 2021



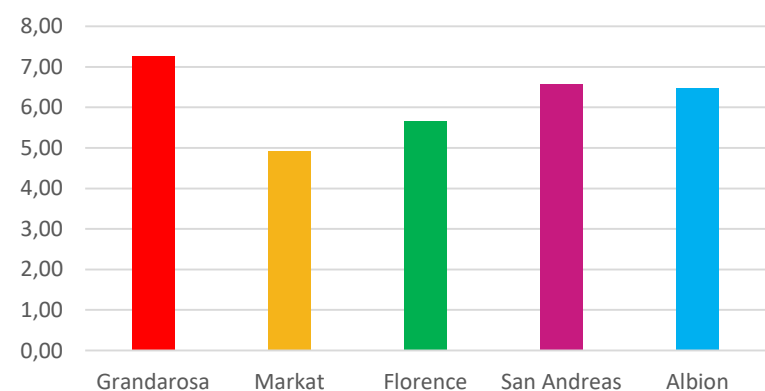
Fruit firmness 2021



Average fruit weight 2022



Fruit firmness 2022



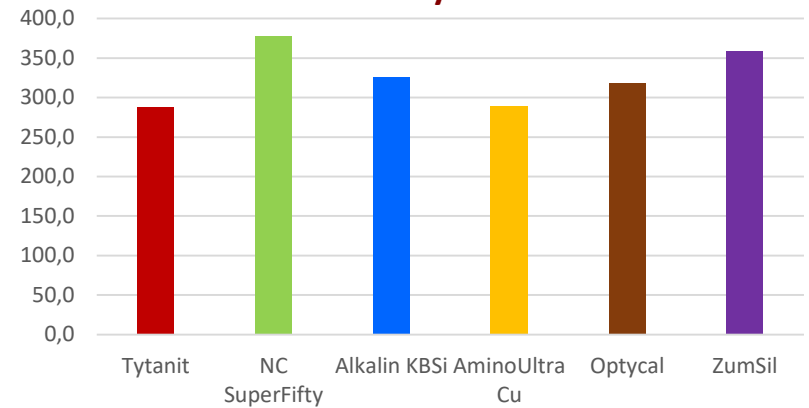
## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

### Means for biostimulants and fertilizers

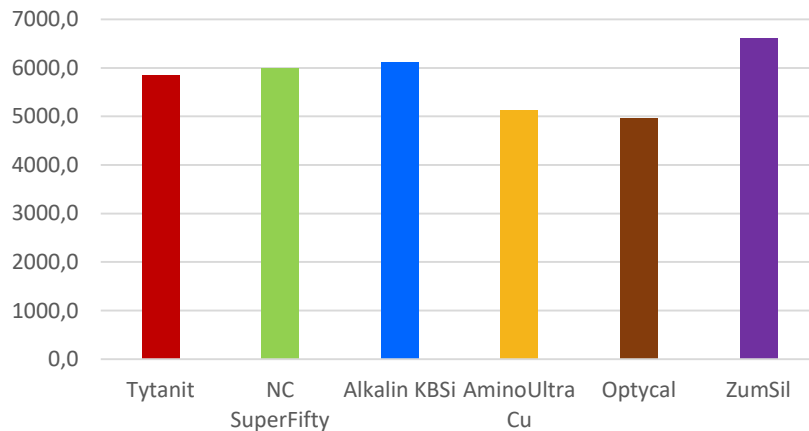
Total yield 2021



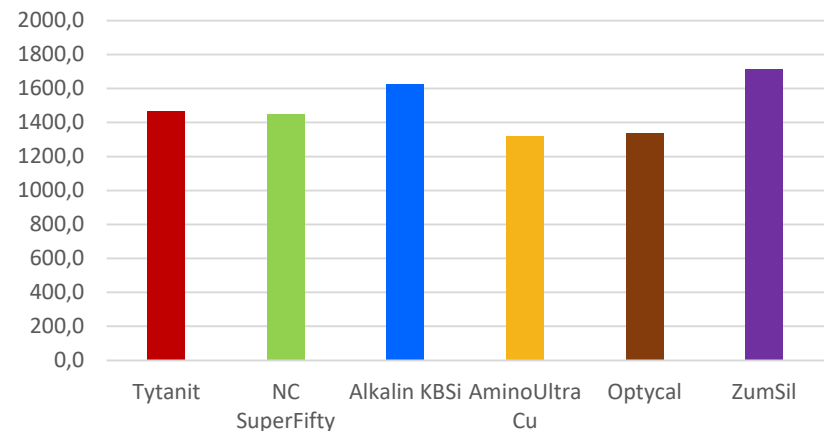
Marketable yield 2021



Total yield 2022



Marketable yield 2022

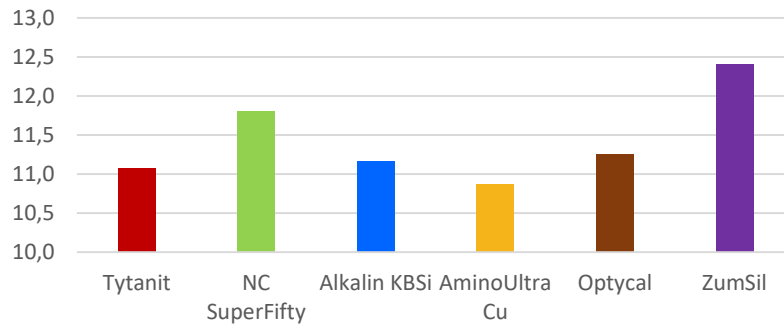




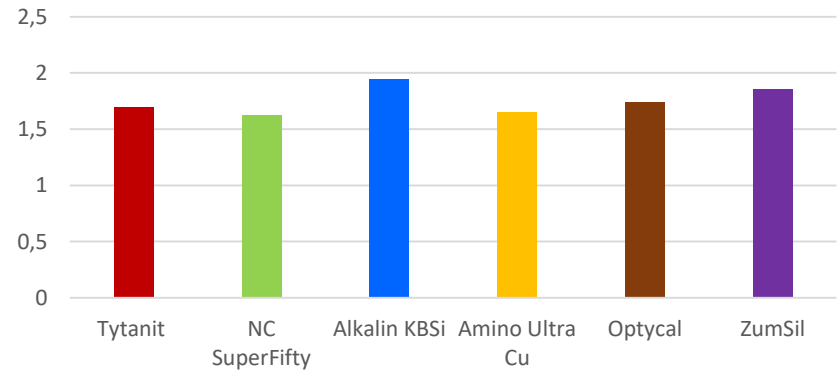
## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

### Means for biostimulants and fertilizers

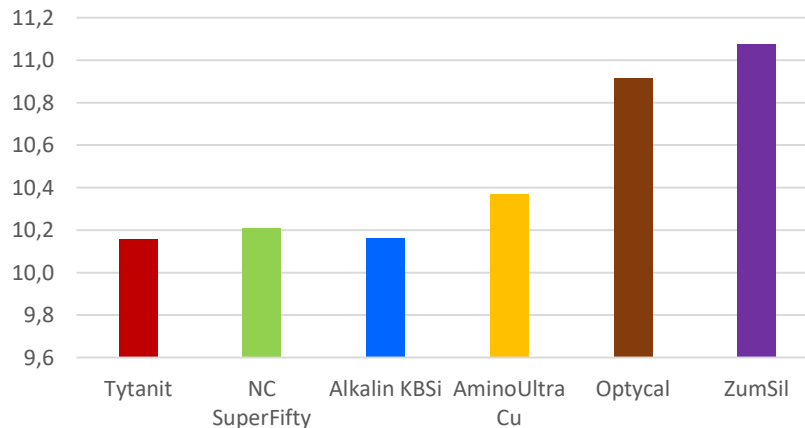
Average fruit weight 2021



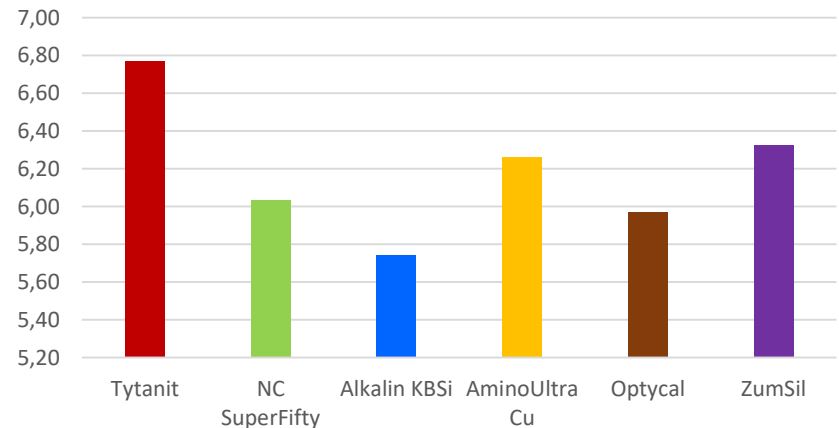
Fruit firmness 2021



Average fruit weight 2022



Fruit firmness 2022



## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

### CONCLUSIONS:

- **ZumSil** increased the flower number, fruit yield and fruit weight, glossiness and firmness, and reduced the share of distorted fruit in the total number of harvested fruits. In 2021, the fruits of the combinations treated with the stimulant ZumSil were rich in ascorbic acid but poor in anthocyanins.
- **Alkaline KB+Si** increased plant growth vigor, fruit yield and firmness. In 2021 it also improved the anthocyanin content, but simultaneously decreased the level of ascorbic acid in the fruit.
- **Titanit** and **Amino Ultra Cu** improved fruit firmness and attractiveness.
- **Optycal** improved fruit weight, glossiness and taste.
- **San Andreas** - the highest yield, high attractiveness and firmness of the fruit, but also the highest proportion of distorted and rotted fruits in the total number of harvested fruits (like Albion). Its fruits - poor in extract, acidity, and ascorbic acid.
- **Grandarosa** – the highest yield among the short-day genotypes tested, the largest and very firm fruit, which contained the highest amount of extract and ascorbic acid
- **Florence** - fruits had the highest content of anthocyanins.

### Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

#### Raspberry:

Floricane - Canby, Laszka, Sokolica, Ninni, Duo;

Primocane - Polka, Polonez, Poemat, clones: MJ-14 and MJ-57;

Primocane-Floricane – clones: MLD-26, MLD-37, MLD-104, MLJ-278 and, MLJ-317.

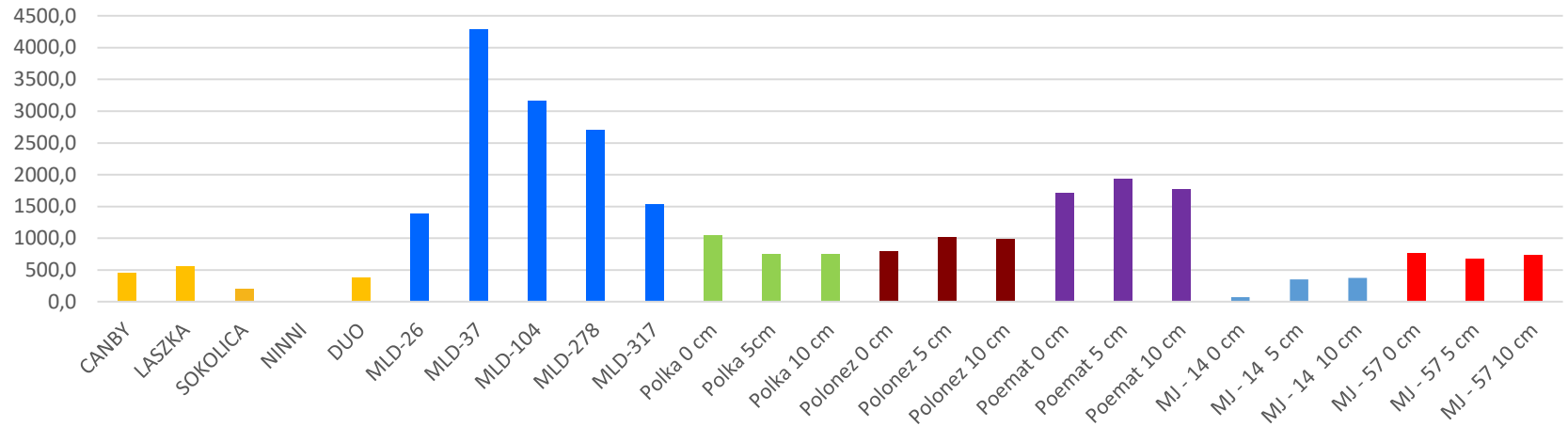
Different methods of pruning the shoots will be used: floricanes and primocane-floricanes - at a height of 180 cm, primocane - at a height of 0.0 cm, 5.0 cm and 10 cm above the ground.

**Assessment:** fruit yield, attractiveness, colour, shape, taste and chemical composition of the fruit.

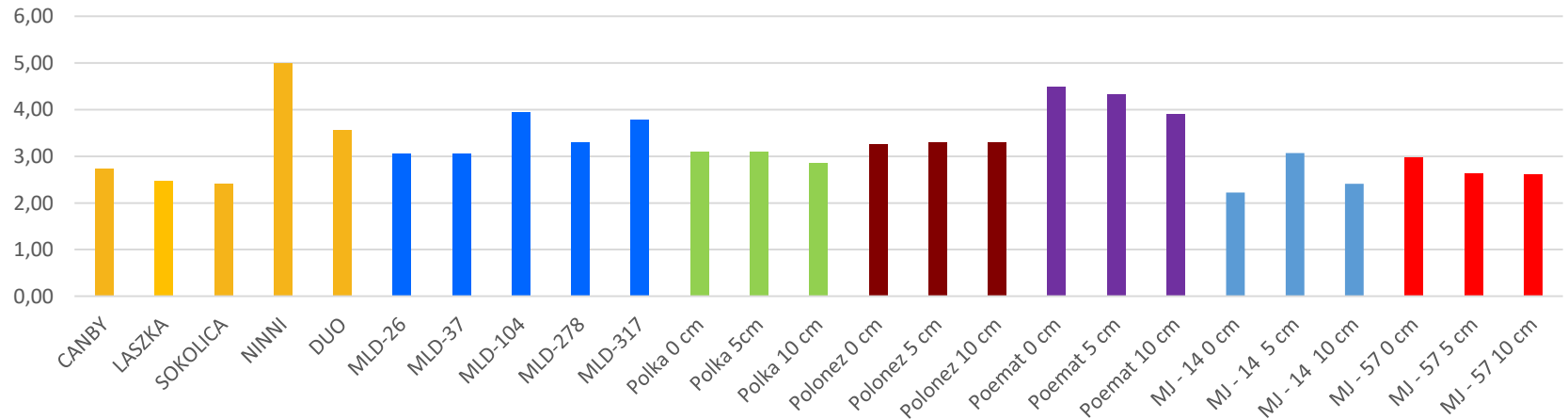


## Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

Raspberry fruit yield 2022 (g/plot)



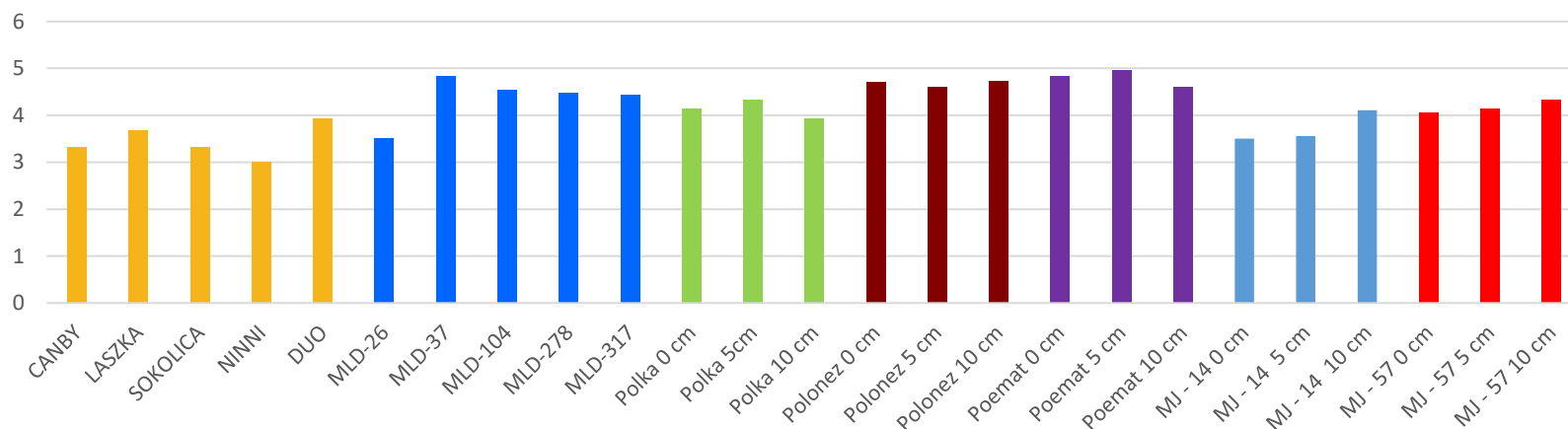
Average weight of raspberry fruit (g)



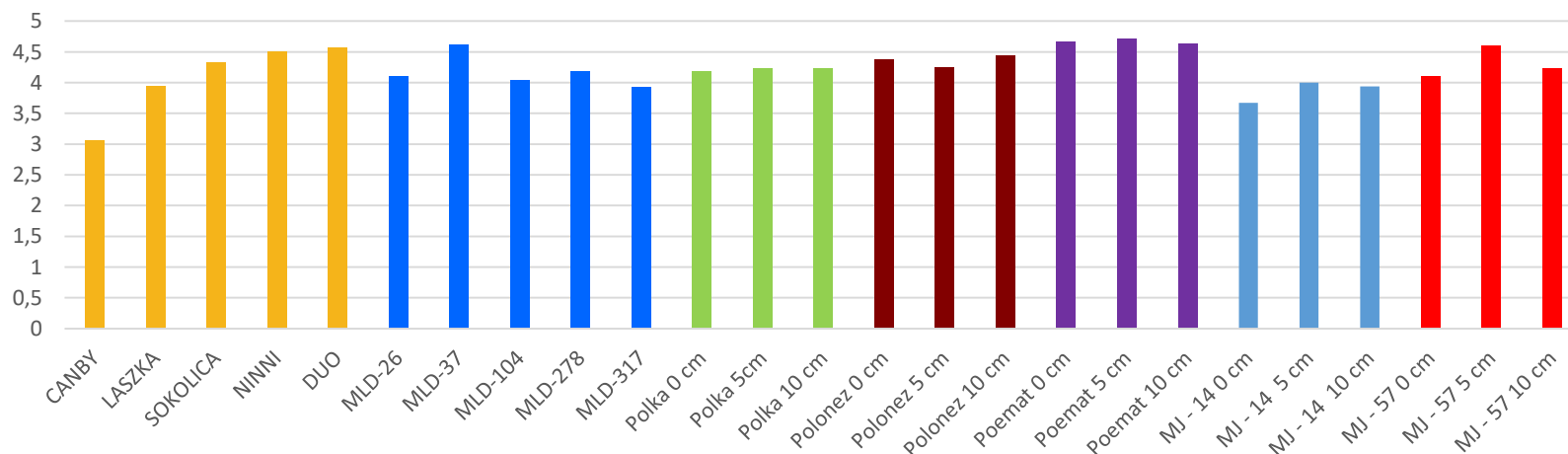
The most productive - primocane-floricane genotypes (MLD-37). The lowest yield – floricane cvs.  
The largest fruit – NINNI and POEMAT. The lowest fruit weight – Sokolica and Laszka.

### Task 3.4. Improving production technology to extend the harvest period and supply the market with fresh berries (INHORT and NIBIO)

Fruit attractiveness 2022 (ranking scale 1-5)



Fruit firmness 2022 (ranking scale 1-5)



The most attractive fruit – MLD-37, POEMAT and POLONEZ.

The firmest fruit – MLD-37, POEMAT, NINNI and DUO. The lowest fruit firmness – Canby.



## WP5. Optimization of the berry production potential in terms of quantity and quality by using the metaxenia phenomenon (WP Leader Agnieszka Masny)

**Task 5.1. Assessment of the possibilities to improve the strawberry, red raspberry and currant fruit characteristics by choosing the optimal pollen source for pollination of flowers (INHORT)**

**Strawberry (5):** Grandarosa, Markat, Florence, Elsanta and Frida

**Raspberry (5):** Glen Ample, Przehyba, Willamette, Veten, Tulameen

Both pollination programs were carried out in a full diallel design (Griffing's method I). In this design, each cultivar will represent mother and a father (pollen donor for pollinated mothers). This design will also allow fruit to be obtained from mother plants which will be self-pollinated.





## Task 5.1. Assessment of the possibilities to improve the strawberry, red raspberry and currant fruit characteristics by choosing the optimal pollen source for pollination of flowers (INHORT)

2021	2022
<p><b><u>Strawberry:</u></b> depending on the cross combination, 8 to 38 flowers were pollinated and 0 to 11 fruits were obtained. Pollination efficiency (% of obtained fruit in relation to pollinated flowers) ranged from 0 to 87.5 %. The lowest pollination efficiency was found in self-pollination of the cultivars Frida (0 %), Florence (7.9 %) and Markat (16.7 %) and in the crossings of Frida x Markat (2.5 %), Florence x Markat (5.4 %), Florence x Elsanta (10.0 %) and Florence x Frida (10.5 %).</p>	<p><b><u>Strawberry:</u></b> depending on the cross combination, 10 to 44 flowers were pollinated and 0 to 7 fruits were obtained. Pollination efficiency (% of obtained fruit in relation to pollinated flowers) was much lower than in 2021 and ranged from 0 to 38.5 %. The lowest pollination efficiency was found in self-pollination of the cultivars Markat and Florence and in the crossings of Markat x Grandarosa, Markat x Florence, Florence x Elsanta, Florence x Frida and Frida x Florence (0 %).</p>
<p><b><u>Raspberry:</u></b> depending on the cross combination, 63 to 116 flowers were pollinated and 38 to 96 fruits were obtained. Pollination efficiency ranged from 54.3 % to 100 %. The lowest pollination efficiency was characterized by the cross combinations of Przehyba x Glen Ample (54.3 %) and Glen Ample x Przehyba (63.6 %). The self-pollination efficiency ranged from 79.1 % for Przehyba to 100% for Willamette.</p>	<p><b><u>Raspberry:</u></b> depending on the cross combination, 77 to 176 flowers were pollinated and 31 to 169 fruits were obtained. Pollination efficiency ranged from 25.2 % to 97,4 %. The lowest pollination efficiency was characterized by the cross combinations of Glen Ample x Tulameen (25,2 %) and Glen Ample x Willamette (30,3 %). The self-pollination efficiency ranged from 79.2 % for Glen Ample to 97,4% for Willamette.</p>

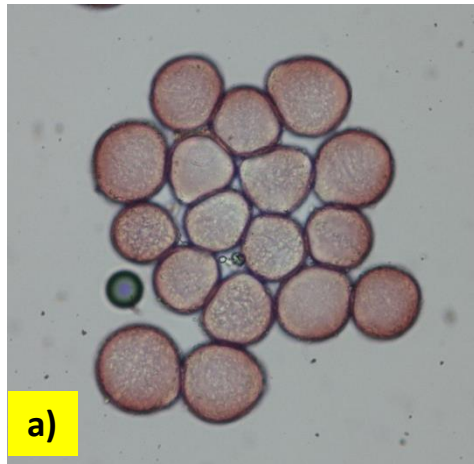
## Task 5.2. Assessment of pollen viability of studied berry cultivars. (INHORT)

**Strawberry (5):** Grandarosa, Markat, Florence, Elsanta and Frida

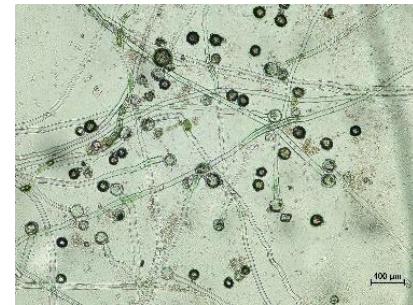
**Raspberry (5):** Glen Ample, Przehyba, Willamette, Veten, Tulameen

### Two methods of pollen assessment:

1. Assessing the staining of pollen grains with 2% aceto-orcein to determine the viability of pollen grains (pollen is considered viable when 75-100% of the grains are stained)
2. Assessing the ability of pollen to germinate and produce a pollen tube in vitro.  
In this method, pollen grains were placed on a control medium (water, 1% agar) and a medium composed of 10% sucrose, 5 mg / l  $\text{H}_3\text{BO}_3$ , 1% agar (changes according to Y. Sharafi). After 24-48 hours of incubation in the dark, the number of germinated grains was recorded at 25°C.



Raspberry pollen grains: a) non-viable, b) viable



Raspberry pollen tubes germinated

## Task 5.2. Assessment of pollen viability of studied berry cultivars. (INHORT)

2021	2022
<p>Acetoorcein staining did not show large differences in pollen viability of the studied cultivars, these values are within the range of 85 % - 100 % for strawberry and 70 % - 100 % for raspberry. The germination of pollen on the media was lower than that observed after staining with acetoorcein.</p>	<p>Acetoorcein staining did not show large differences between the cultivars, these values are in the range of 70% - 100% for strawberries and almost 100% for raspberries. The observed pollen germination on the media was lower than that observed after staining with acetoorcein.</p>
<p><b>Strawberry</b> pollen tube germination on the control medium was close to zero for three cultivars - Grandarosa, Frida and Florence. Only for Markat, the germination capacity of 27 % was observed in conditions with limited availability of nutrients stimulating their growth. The medium enriched with sucrose and boric acid stimulated the pollen tubes to grow in the range from 23 % for Grandarosa to 66 % for Markat.</p>	<p>Strawberry pollen tube germination on the control medium did not exceed 10%. The medium enriched with sucrose and boric acid stimulated the pollen tubes to grow in the range from 9% for Grandarosa to 57% for the Florence. The average length of the strawberry pollen tubes was in the range of approx. 300 µm for Markat to 500 µm for Florence.</p>
<p><b>Raspberry</b> pollen grains showed a much higher ability to germinate on the control medium (15 % - 40 %) than in the other two species. The use of a nutrient richer medium allowed the observation of an increase in the germination capacity of the pollen tubes from 41 % (Tulameen) to 60 % (Veten, Przehyba, Willamette).</p>	<p>The germination capacity of raspberry pollen tubes on the medium according to Sharafi (2011) ranged from 42% (Tullamen) to 60% (Przehyba). On the control medium, the germination capacity of the pollen tubes of these cultivars was 5% and 24%, respectively.</p>

## Task 5.3. Evaluation of selected fruit characteristics of strawberry, red raspberry and blackcurrant (INHORT)

**Strawberry (5):** Grandarosa, Markat, Florence, Elsanta and Frida

**Raspberry (5):** Glen Ample, Przehyba, Willamette, Vetten, Tulameen

### Assessment:

- external fruit quality (fruit weight, shape, skin color)
- internal fruit quality (soluble solids content, anthocyanins content, phenolic compounds, ascorbic acid and acidity).



## Task 5.3. Evaluation of selected fruit characteristics of strawberry, red raspberry and blackcurrant (INHORT)

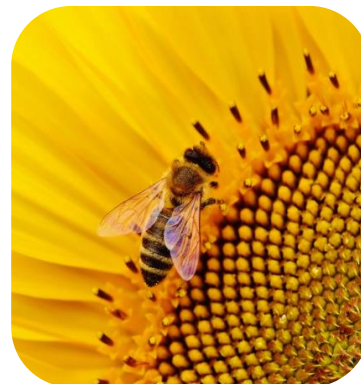
2021	2022
<p><b>Strawberry:</b> the largest fruits from the crosses: Elsanta x Florence and Elsanta x Frida.</p> <p>The smallest fruit from self-pollination of Grandarosa, crosses of Markat x Frida and Frida x Markat.</p> <p>The differences in the weight of the fruit produced by the same maternal cultivar, but pollinated with pollen from different paternal cultivars, are twice (for Elsanta and Florence) to 9 times for Grandarosa.</p> <p>The highest amounts of extract in fruits from Grandarosa x self, and the least - from the crossing of Elsanta x Frida.</p>	<p><b>Strawberry:</b> the largest fruits from the crosses: Florence x Grandarosa and Grandarosa x Elsanta.</p> <p>The smallest fruit from the crosses of Grandarosa x Markat, Markat x Frida and Elsanta x Grandarosa.</p> <p>The differences in the weight of the fruit produced by the same maternal cultivar, but pollinated with pollen from different paternal cultivars, were up to 10 times for Grandarosa and Florence.</p> <p>Chemical analyses in progress.</p>
<p><b>Raspberry:</b> weight of the fruits from the crossbreeding program ranged from 1.78 g for Veten x self-pollination to 4.23 g for Glen Ample x self-pollination.</p> <p>The difference in the weight of fruits produced by the same mother form, but pollinated with different pollen, was max. 1.5 times (for Glen Ample).</p> <p>The highest content of the extract - in the fruit of Willamette x Przehyba crossing.</p> <p>The most rich in ascorbic acid - fruits of Przehyba x Tulameen, in anthocyanins – fruits of Willamette x Veten, and phenols - Willamette x self.</p>	<p><b>Raspberry:</b> weight of the fruits from the crossbreeding program ranged from 0.89 g for Veten x Glen Ample to 2.87 g for Przehyba x self-pollination.</p> <p>The difference in the weight of fruits produced by the same mother form, but pollinated with different pollen, was max. 1.5 times (for Tulameen).</p> <p>Chemical analyses in progress.</p>



**The project is implemented under the Norwegian Financial Mechanism for 2014-2020 „Working together for a green, competitive and inclusive Europe”.**

**Projekt jest realizowany w ramach Norweskiego Mechanizmu Finansowego na lata 2014-2020 „Wspólnie działamy na rzecz Europy zielonej, konkurencyjnej i sprzyjającej integracji społecznej”.**

[www.inhort.pl](http://www.inhort.pl)



**THANK YOU FOR ATTENTION!**