



PRACTICES PERFORMANCES & RESULTS

Test of new strawberry cultivars adapted to dry conditions

<Ahlam Hamim (INRA Maroc), Bruno MEZZETTI9 (Italy, UNIVPM) , Beatrice Denoyes (INRA France)
Douaé Lamrahi (Messem), Hicham Essrifi (Messem), Ahmed Taleb (Danone), Aziz Didicheikh(GIZ)

01.01.2018 to 31.12.2020

Supported by:





History of experiments and selection of practice

UNIVPM, INVENIO and CREA identified 15 strawberry breeding selections from their breeding programs. After testing them in Italy and Spain, they were selected and propagated in nursery to set up a joint larger trial in Morocco. Yield and fruit quality parameters were collected in 2019 and 2020, with the following experimental trial:

- Each of 15 selections and Florida Fortuna, as control cultivar, were tested with 100 plants, divided in 4 plots of 25 plants.
- With this experimental scheme, 2 trials were set up : (1) standard irrigation system; (2) reduced irrigation water restitution = 70%





Description of the practice selected for the leaflet

What ? Testing new breeding lines for identifying strawberry cultivars with increased resilience to climate change and fruit quality.

Why ? Identify new cultivars adapted for southern conditions, in order to reduce water use, reduce pest and disease incidence and increase fruit quality.

Status ? on-going experiment



Main steps to implement this practice

UNIVPM, INVENI and CREA identified 15 strawberry breeding selections from their breeding programs. After testing them in Italy and Spain, they were selected and propagated in nursery to set up a joint larger trial in Morocco. Yield and fruit quality parameters were collected in 2019 and 2020, with the following experimental trial:

- Each of 15 selections and Florida Fortuna, as control cultivar, were tested with 100 plants, divided in 4 plots of 25 plants.
- With this experimental scheme, 2 trials were set up : (1) standard irrigation system;
(2) reduced irrigation water restitution = 70%.

1. **Conditions of use:**
2. This practice could be useful for nurserymen and/or farmers



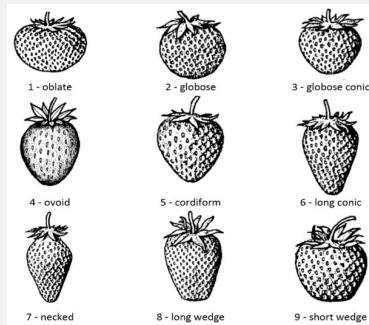


Methodology Description

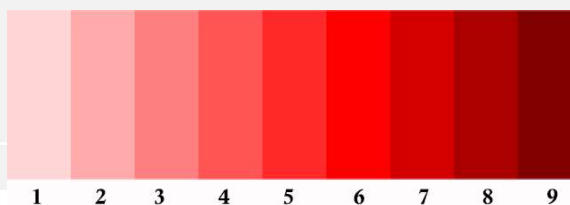
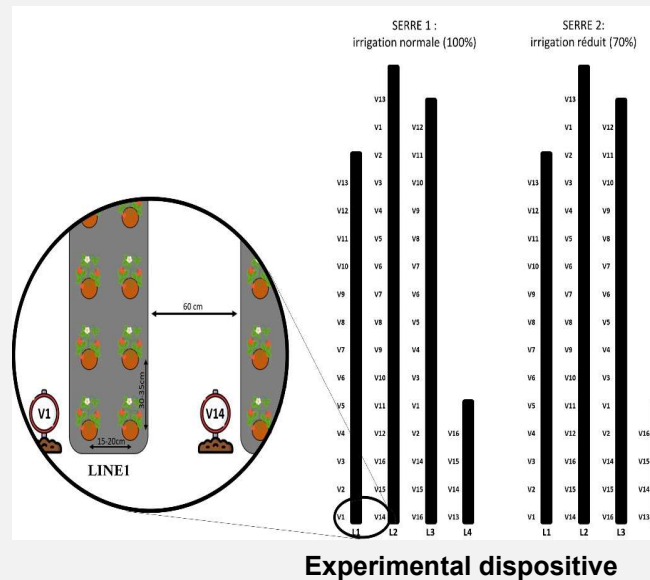
- Date 07/22/2019
- Under tunnels/ 2 irrigation mode 100%, 70%
- Control: fortuna, victory, San Adreas.

Parameters

- Total weight (g/plant)
- Non-Marketable (g/plant)
- Discarded (g/plant)
- Organoleptic test
- Brix, pH, Acidity



Quality parameters



Number	Cultivars
V1	Pir 251.1 - Crea,
V2	Pircinque - Crea
V3	EXP 121 - CIREF
V4	EXP 801 - CIREF
V5	Lam 18 – Crea
V6	EXP 645 – CIREF
V7	EXP 129 – CIREF
V8	EXP 118 -CIREF,
V9	Pir 94.6 - Crea,
V10	Jonica - Crea,
V11	AN 13,13,55
V12	AN 12,20,53
V13	AN 13,13,62
V14	AN 12,45,53
V15	AN 14,21,61
V16	Fortuna



Expected Key result / Message to take home

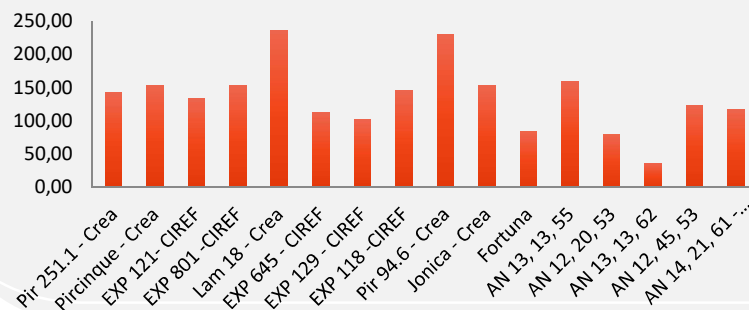
< Key result of the experimentation, message to take home >

Fifteen new breeding selections were identified from trials carried out from UNIVPM, INVENIO and CREA, in different locations (Italy, France and Spain). They were tested on a joint trial in Marocco, to compare their response to southern cultivation conditions, even at a reduced water restitution.

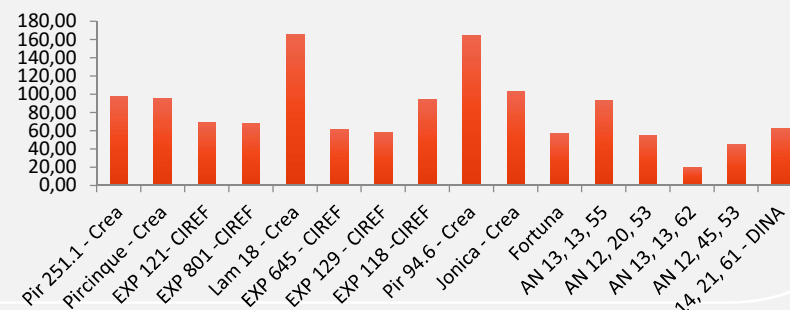
Data from the large trial carried out in Marocco evidenced a different response of the different genotypes and several showed a better performance in comparison with the control 'Florida Fortuna'. This difference was detected both at standard and reduced water restitution regimes.

Most of the genotypes showing higher commercial yield in both trials also showed a reduced amount of not marketable fruit, showing a lower amount of deformed and rotted fruit.

Message to take home: AN13,13,55, Dina (UNIVPM), EXP118, EXP801, EXP121 (INVENIO) and Lam18 and Pircinque (CREA) were identified of interest for the commercial yield, reduced discarded fruit and better fruit quality. These new genotypes can be proposed to growers as new resilient cultivars for a more sustainable strawberry cultivation in the south.



Total weight (g/plant)



Commercial yield (g/plant)



RESULT



Organoleptic test


Code_variété	Couleur	Gout	Forme	Consistance	Odeur
V1	15	15	14	13	11
V2	16	17	14	13	14
V3	12	12	13	9	9
V4	12	12	11	11	10
V5	11	11	10	11	11
V6	14	9	12	13	9
V7	15	14	13	12	12
V8	12	11	13	11	12
V9	15	12	13	17	10
V10	12	14	10	15	9
V11	13	12	13	13	11
V12	14	14	14	13	12
V13	14	14	14	14	13
V14	13	14	13	13	12
V15	11	14	12	10	12
V16	13	12	13	13	13
Victory	15	15	16	13	10
San-Andreas	14	14	13	13	13
Fortuna	14	10	14	12	9





RESULT

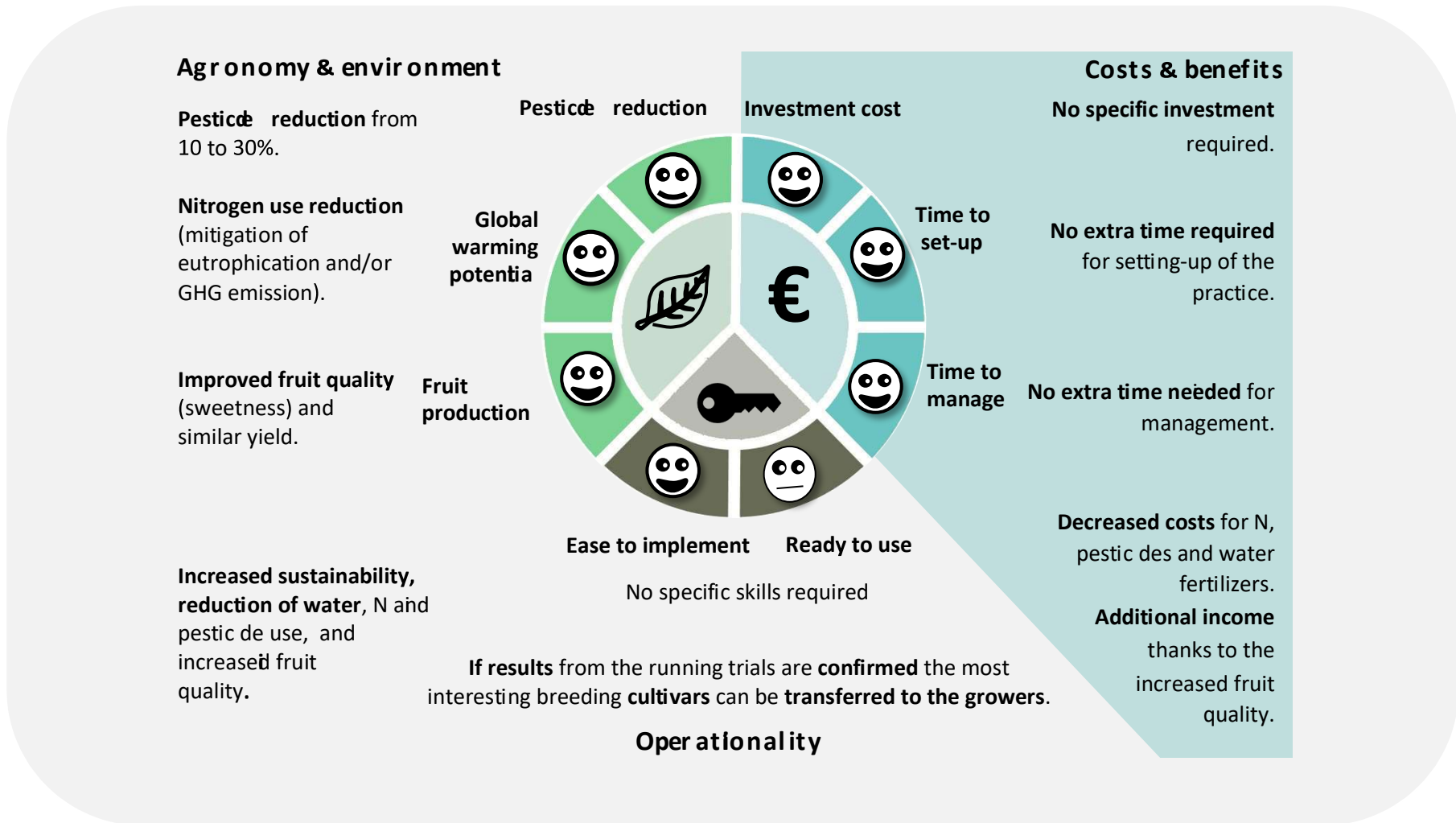
Brix, pH, acidity



Code_Variété	Brix	Ph	Acidité
V1	12,03	3,7	0,54
PIRCINQUE 5 CREA	12,3	3,7	0,51
EXP121 INVENIO	8,6	3,7	0,47
EXP 801 INVENIO	8,1	3,5	0,6
LAM 18 CREA	8,3	3,6	0,35
V6	7,8	3,5	0,49
V7	10,03	3,7	0,53
EXP118 INVENIO	8,5	3,5	0,53
V9	8,8	3,7	0,52
V10	8,3	3,7	0,49
AN13,13,55 UNIVPM	7,6	3,6	0,32
V12	9,1	3,7	0,43
V13	7,8	3,5	0,41
V14	8,6	3,6	0,5
V15	9,8	3,7	0,6
DINA UNIVPM	9,6	3,6	0,33
V17 : Victory	6,3	3,6	0,4
V18 : San-Andreas	8,3	3,5	0,43
V19 : Fortuna	5,4	3,6	0,4



Practice Performances





Roadmap for transfer– Next steps

- From trials carried out from UNIVPM, INVENIO and CREA, in different locations (Italy, France and Spain) were identified 15 new breeding selections that were proposed for a joint trial in Marocco, to compare their response to southern cultivation conditions, even at a reduced water restitution.
- Data from the large trial carried out in Marocco evidenced a different response of the different genotypes and several showed a best performance in comparison with the control 'Florida Fortuna'. This difference was detected both at standard and reduced water restitution regimes.
- **AN13,13,55, Dina (UNIVPM), EXP118, EXP801, EXP121 (INVENIO) and Lam18 and Pircinque (CREA)** were identified of interest for the commercial yield, reduced discarded fruit and better fruit quality.

New larger field trials with these 7 selections/cultivars will allow to better identify which one can have a larger commercial development in southern cultivation areas, because of their higher plant rusticity (requiring less water and nitrogen), tolerance to major soil and fruit diseases, and increased fruit quality, in particular firmness, shelf life and sweetness (°Brix).



Friendly Fruit

PRACTICES PERFORMANCES & RESULTS

**knowing plant plasticity to optimize
strawberry yield using architecture analysis**

Béatrice Denoyes, INRAE, UMR 1332, Bordeaux, France



Marie-Noële Demené, INVENIO, Douville, France



01.01.2018 to 31.12.2020

Supported by:



Climate-KIC

Climate-KIC is supported by the
EIT, a body of the European Union

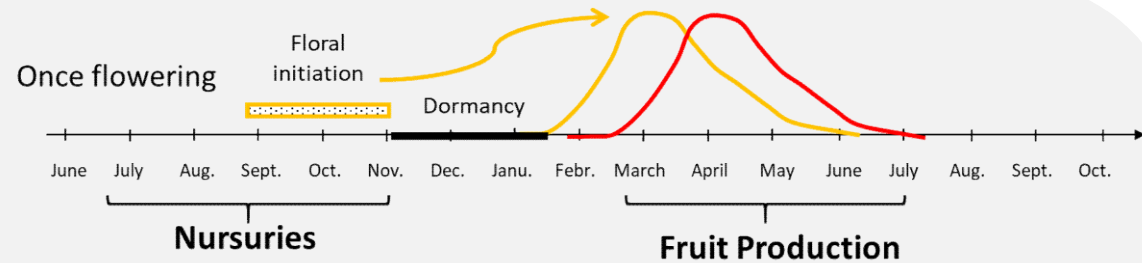




History of experiments and selection of practice

<write a short overview of the experiments that have been tested since the start of the project

AND why this particular practice/experiment was retained as the most promising in terms of results and future transfer>



$$\text{Yield} = \text{Potential of production (Fl. In.)} + \text{Expression of this potential}$$



History of experiments and selection of practice

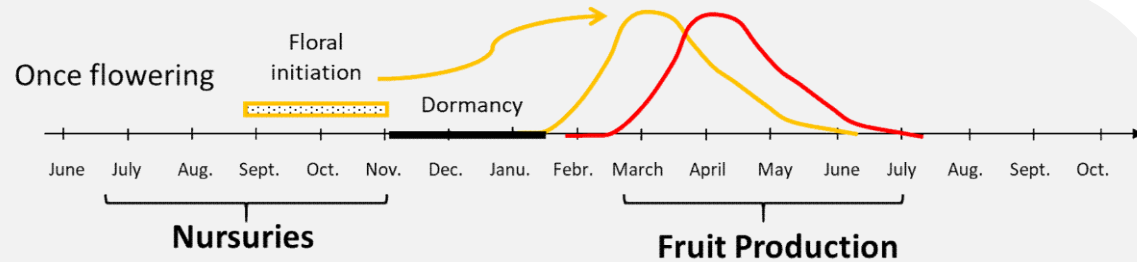
<write a short overview of the experiments that have been tested since the start of the project
AND why this particular practice/experiment was retained as the most promising in terms of results and future transfer>

Before nursery

Plant-bearing stolons on mother plants



Plant-bearing stolons are produced in different environments



$$\text{Yield} = \text{Potential of production (Fl. In.)} + \text{Expression of this potential}$$

Study of the impact of the origin of mother plants, which produce the plant-bearing stolons → 8 origins

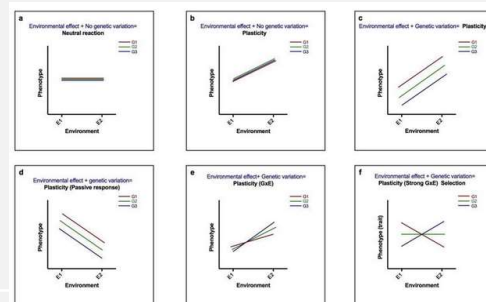


$$\text{Yield} = \text{Mother plant} + \text{Potential of production (Fl. In.)} + \text{Expression of this potential}$$

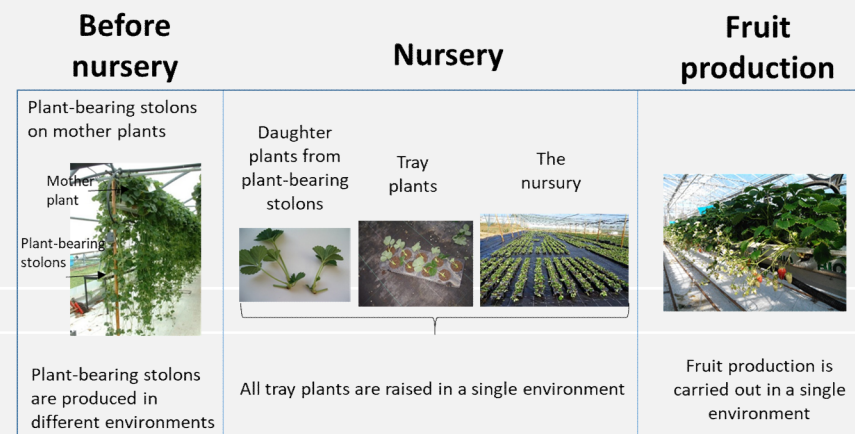


Description of the practice selected for the leaflet

What ? Carrying out architecture analysis to studying strawberry plasticity, i.e. plant's capacity to present different phenotypes according to environment



Why ? To get better knowledge on variability of tray plants according to the origin of their plant-bearing stolons. Finally to develop a more resilient yield.



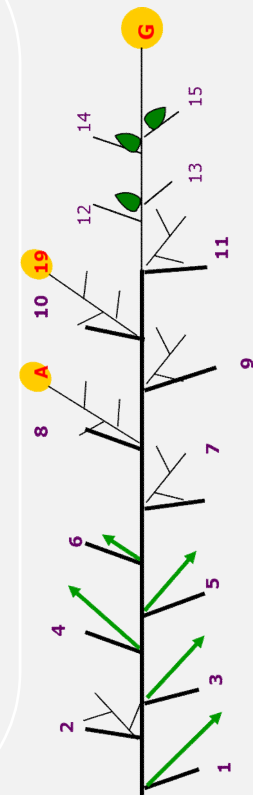
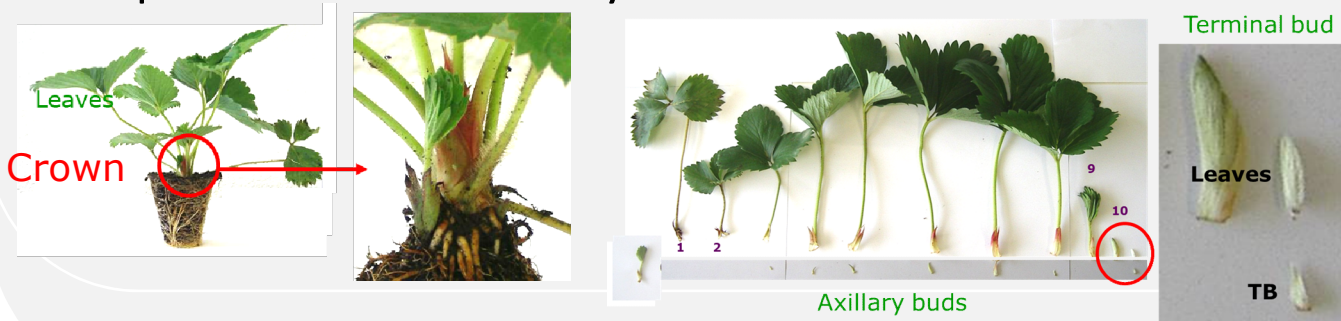
Status ? Ready to use



Main steps to implement this practice

< How should farmers proceed to implement this practice, describe the main steps (do not mention here the experimentation protocole)>

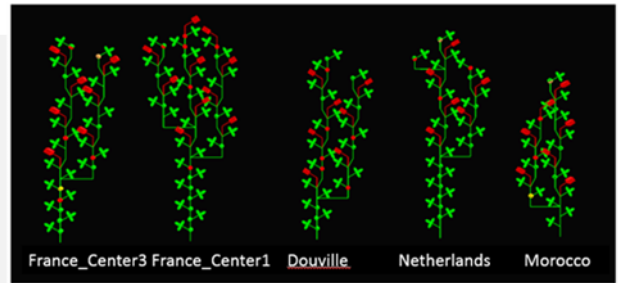
1. **Make a preliminary request** to a specialized laboratory (e.g. Invenio) to fix the condition of sampling, shipment and price;
2. In nursery or in production, **take a sample of 10 plants** representative of a batch. A batch of a single variety represents plants, which have the same mother plant origin, which were transplanted on the same date and in the same place with a single technical culture.
3. **Send the plants** with their roots to avoid any drying out of the plant to the laboratory.





Expected Key result / Message to take home

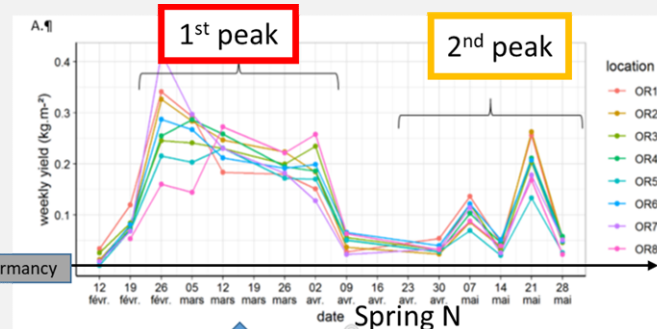
(A) In nursery: Plant-bearing stolons from 11 origins were transplanted and raised at Douville INVENIO to produce trayplants. According to the plant-bearing stolon origin, plants developed more or less secondary axes.



Representation of the central plant of each plant-bearing stolon origin (represented using MTG).

(B) In fruit production: Large differences appeared in peak_1 of production while the peak_2 was similar whatever the plant-bearing stolon origin.

Before nursery:
harvest on
Plant-bearing
mother plants



June-July N-1

Autumn N-1

Dormancy

In nursery:
floral initiation for 1st peak

In fruit production: floral
initiation for 2nd peak

Environment of plant-bearing stolon production is very important for fruit production. Plasticity of strawberry plants are observed in nursery with effect of environment on mother plants that produce plant-bearing stolons



Practice Performances

< If you have completed the Excel file for the **Leaflet** you can obtain your **Performance Graph** to be inserted here by contacting:

-> Aude Alaphilippe aude.alaphilippe@inrae.fr for Apple

-> Marion Casagrande marion.casagrande@inrae.fr for Strawberry

In any case please highlight the **most positive outcome** and the **most negative outcome** >

Practice performances assessed with architecture analysis compared with no information on plant development.

AGRONOMY & ENVIRONMENT

Pesticide reduction
effect not known yet.

Better efficiency of energy use.

Increase in fruit production (yield)

The objective is to select a plant well balanced between vegetative and floral development for **yield resilience** and resistance to pathogens and pests.

Pesticide reduction

N/A

Global warming potential

Fruit production

Ease to implement

Ready to use

The practice would require a training course to be implemented and architecture analyses

On-station architecture approach show plasticity of plants that could be used for improving crop management.

OPERATIONALITY

COSTS & BENEFITS

Extra cost for plant architecture analyses.

Little time needed for contracting and planning with a specialized enterprise

Few hours for preparing plant samples in nurseries or fruit production and send them (1 to 4 samplings).

A few days to get architecture results.

Benefit for optimizing production management (e.g. environmental controls, plant development, etc.).

Positive outcome

Neutral to positive outcome

Areas of

Critical points



Roadmap for transfer– Next steps

<please describe how the practice can/ will be transferred to growers after the end of Friendly Fruit>

Growers and Nurseries can contact labs such as Invenio to analyse their plants

To go further

Architecture on varieties

Open alea strawberry software

