

Are growers and consumers the driven force for *Rubus* breeding?

Pedro Brás de Oliveira

Instituto Nacional de Investigação Agrária e Veterinária, I.P.
Unidade Estratégica de Sistemas Agrários e Florestais e Sanidade Vegetal

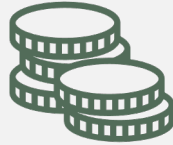
Summary

1. Introduction
 2. The breeding process
 3. Growers objectives
 4. Consumers requests
 5. Breeders problems
-

1. Introduction



Raspberry production



- > High economical value
- > Export oriented



- > Ideal environmental setting
- > 5th largest producer in Europe and 8th largest producer in the world



- > Production is technically demanding
- > Increasing demand for quality and sustainability

Breeding and selection of new material must:

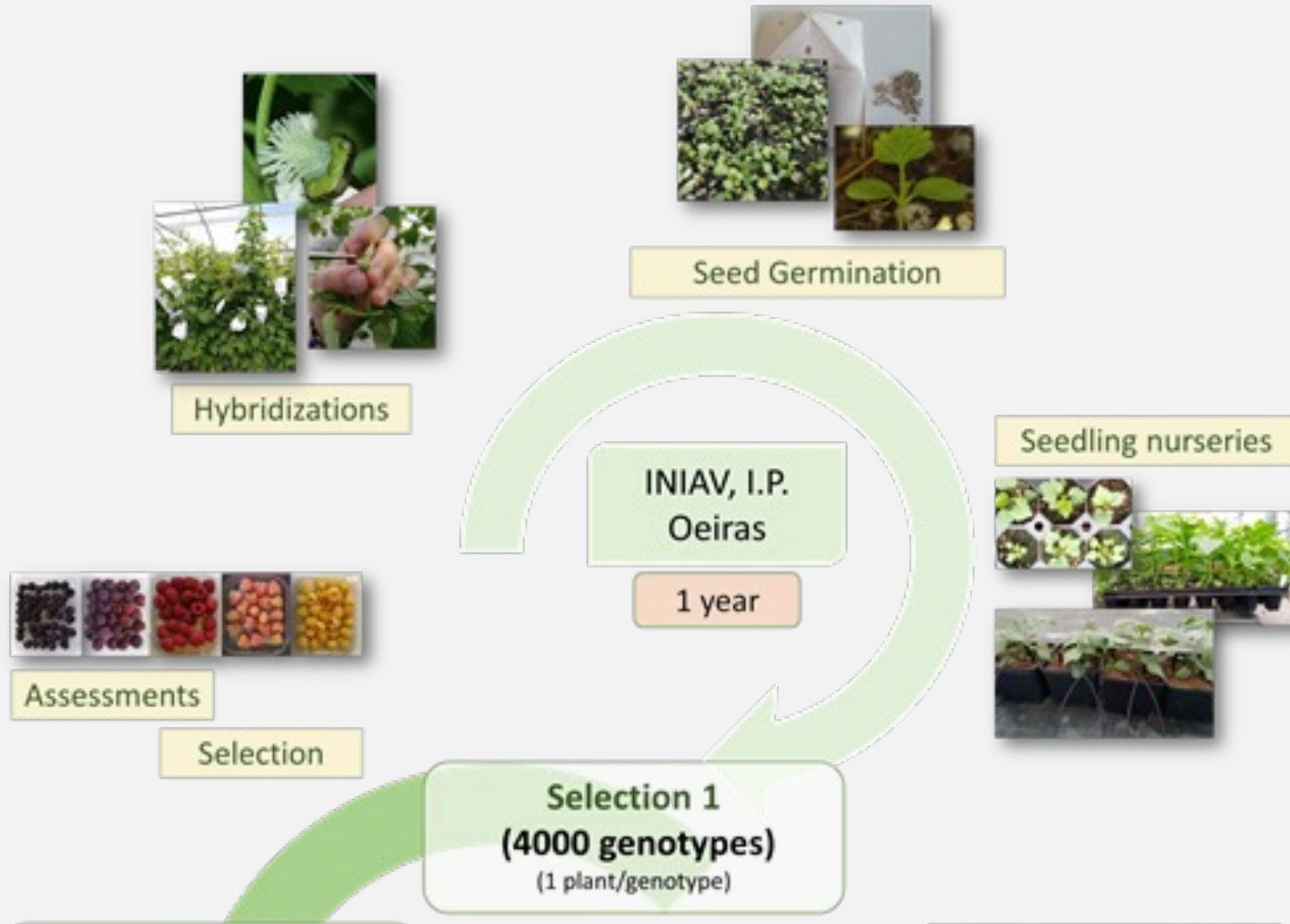
- Be adapted to the region of production,
- Possess relevant characteristics in the market of interest,
- Maximize production sustainability, producers competitiveness and crop profitability.



Collaborative Breeding Program



2. The breeding process

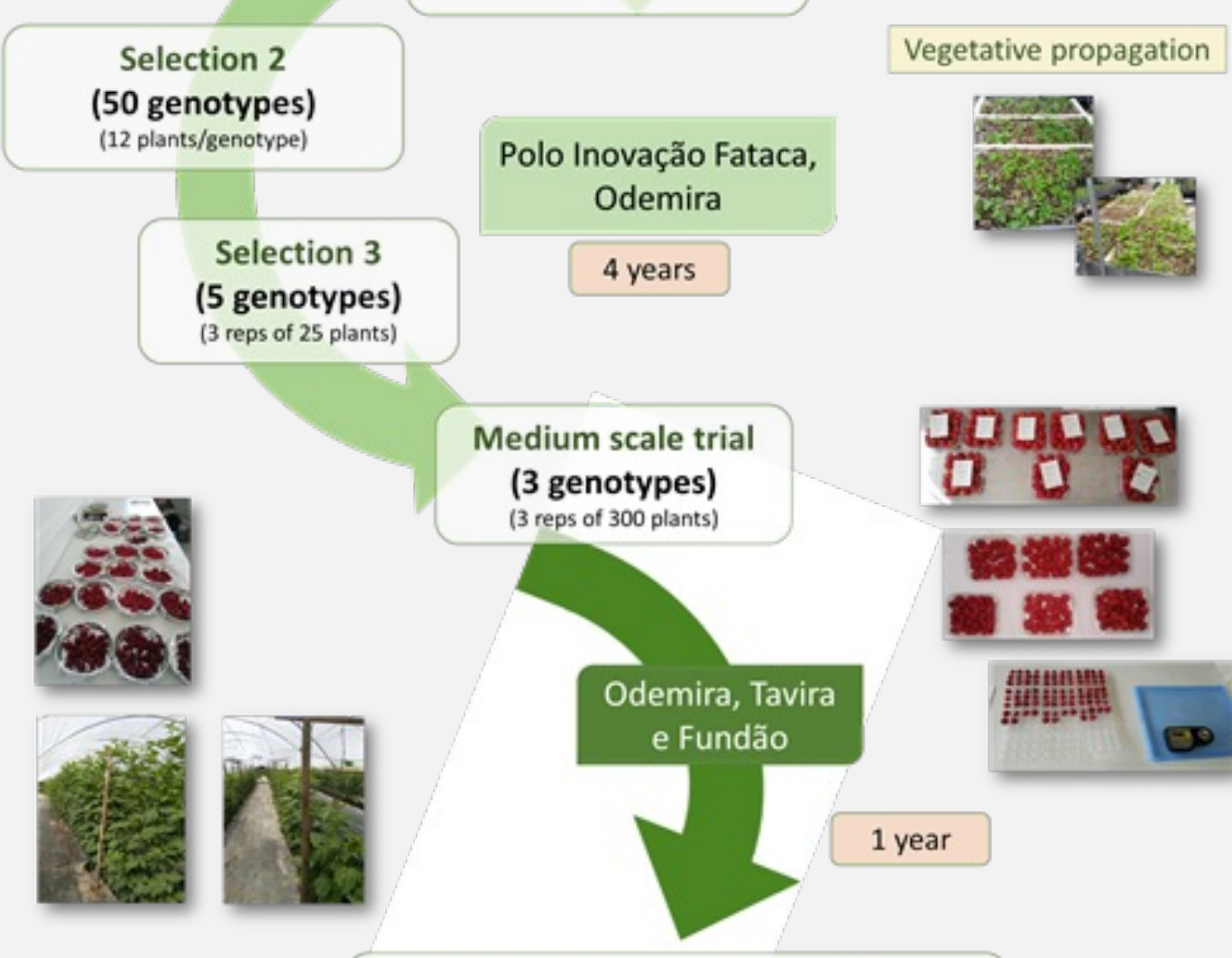


4000
Genotypes

1 Year

2. The breeding process

Replicated trial



50
Genotypes

+ 1 Years

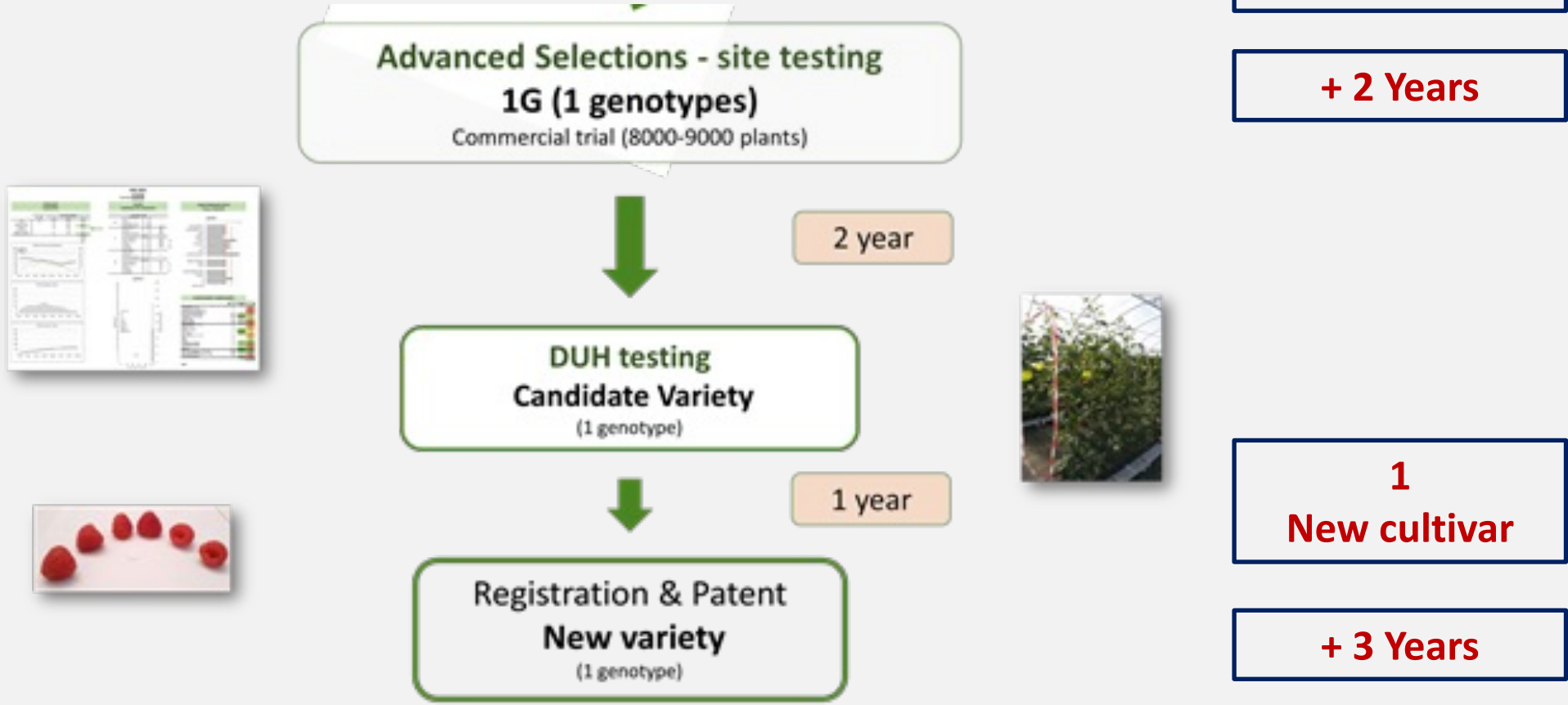
5
Genotypes

+ 1 Years

3
Genotypes

+ 1 Years

2. The breeding process



Example

One promising advance selection

Female Parent (FP)

- Good flavor
- Uniform fruit size
- Good shelf-life performance
- Good productivity
- Adequate plant architecture

Three problems



Late primocane production



High rust susceptibility



Dark fruit color

Crossings

Female Parent
(FP)



x

Male Parent
1 (MP1)



Rust resistance
Family 1

x

Male Parent
2 (MP2)



Earliness
Family 2

x

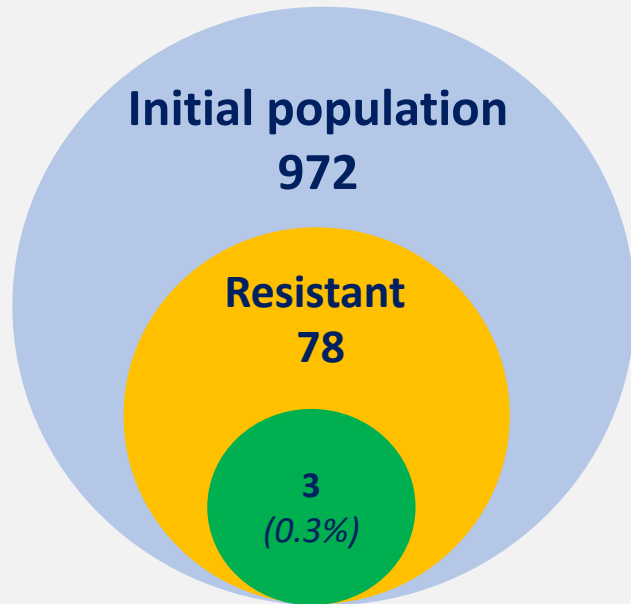
Male
Parent 3
(PM3)



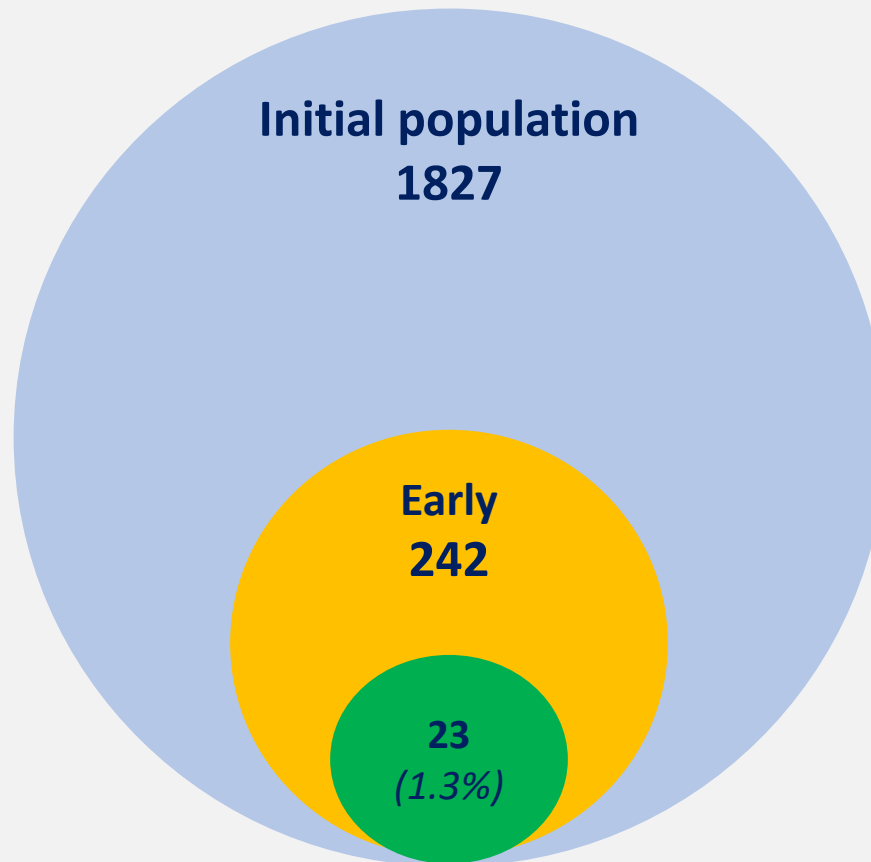
Fruit color
Family 3

Final selections

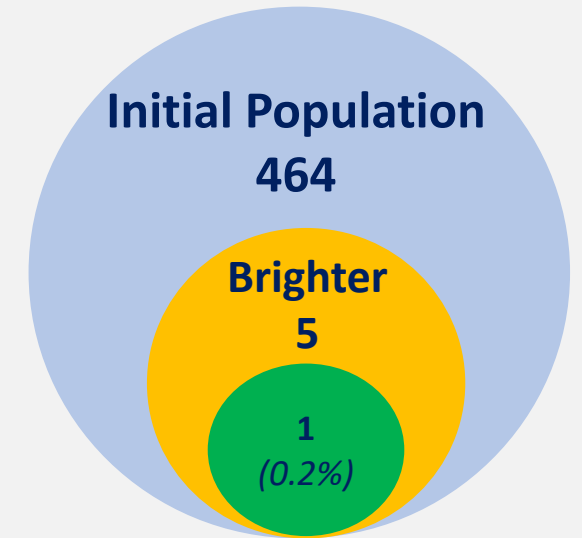
F1: Late leaf rust



F2: Earliness



F3: Fruit color



Future work

**F1: Late leaf
rust**

F2: Earliness

F3: Fruit color

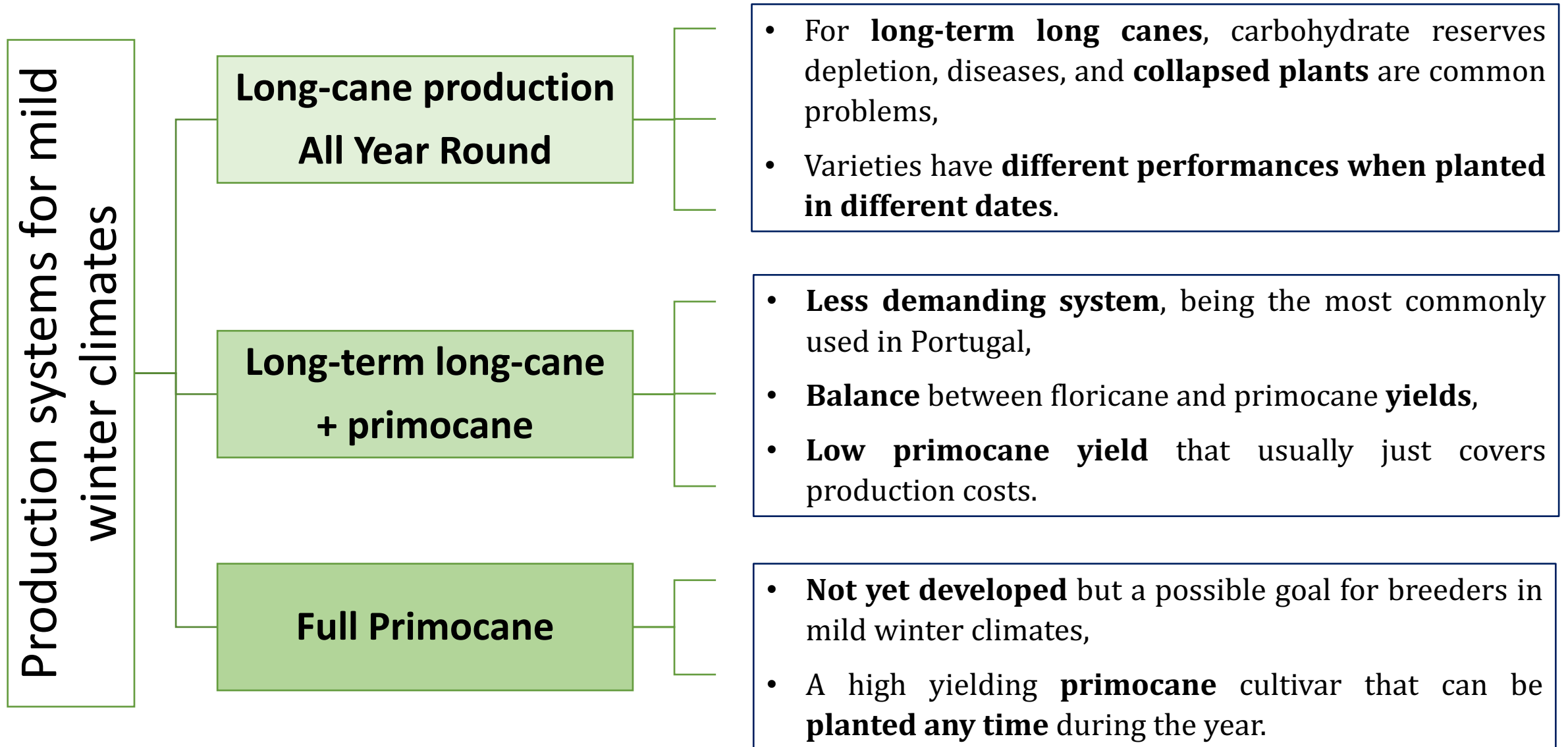
Kept
3
(0.3%)

Kept
23
(1.3%)

Kept
1
(0.2%)

**Combine the 3 desired characteristics in
one elite genotype**

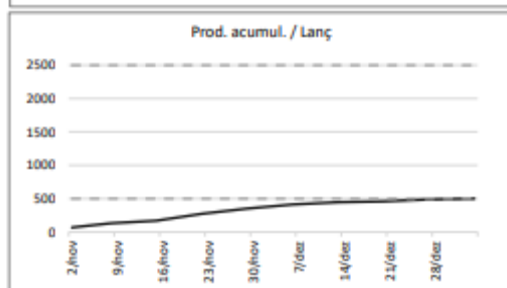
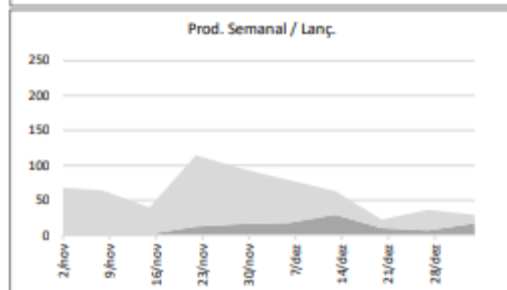
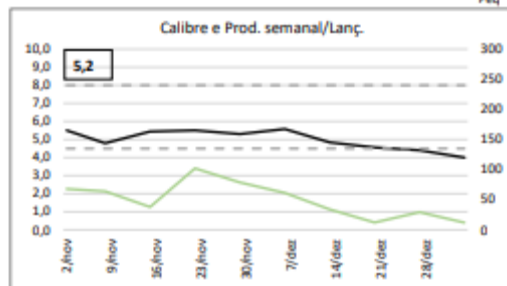
3. Growers objectives



Traits assessment

PRODUÇÃO Lançamento

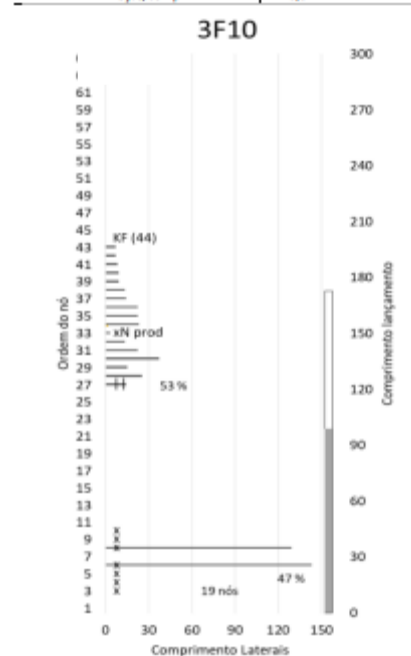
| | Plantação | Curva de produção | | |
|------------------|-----------|-------------------|--------|--------------|
| | | 5% | 50% | 95% |
| Data | 25/jul | 2/nov | 22/nov | 3/jan |
| Duração semnas | | 14 | 17 | 23 |
| Produção/Lanç. | | 68,0 | 272,1 | 499,7 |
| Calibre | | 5,5 | 5,5 | 5,2 |
| Quebra Calibre | | 0,0 | 0,0 | -1,5 |
| Refugo acumulado | | 0% | 5% | 18% |



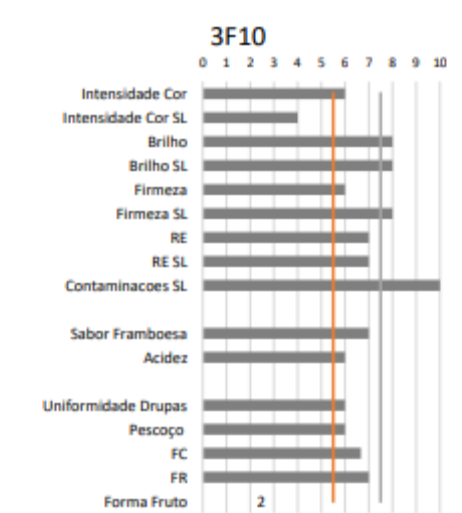
Genótipo:

PLANTA Arquitetura do lançamento

| | LANÇAMENTO TIPO | |
|-------|---------------------|--------|
| | 3F10 | 3F10 |
| Lanç. | Comp. Lanç. R (cm) | 173 |
| | Nº nós | 44 |
| | Vigor (Ø Base, mm) | 22,78 |
| | Vigor (Ø Frut., mm) | 7,71 |
| | | -15,07 |
| R | Comp. R (cm) | 74 |
| | Nº nós R | 18 |
| | Nº nós R produtivos | 18 |
| | | 43% |
| | | 41% |
| NR | Comp. NR (cm) | 99 |
| | Nº nós NR | 26 |
| | Nº nós R produtivos | 1 |
| | | -7 |
| | | |



CARACTERIZAÇÃO FRUTO Fresco e Shelf-life

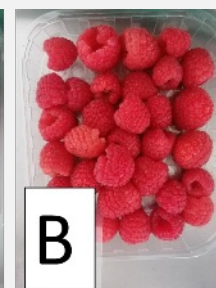
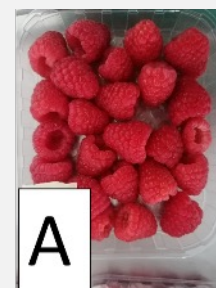


CLASSIFICAÇÃO E OBSERVAÇÕES

| | 3F10 | 3F10 | 3F10 |
|--------------------------------------|---------|--------|------------|
| Precocidade (semanas) | 11 | 10 | 0,72 |
| Duração fase produtiva (dias) | 8,85714 | 5 | 0,05 |
| Distribuição da produção (dias) | 2,85714 | 9 | 0,08 |
| Prod comercializável/lanç | 499,7 | 1 | 0,20 |
| % Refugo (95% curva prod.) | 18% | 2 | 0,05 |
| Calibre médio | 5,2 | 6 | 0,49 |
| Calibre variação | -1,5 | 6 | 0,32 |
| Intensidade cor (à colheita) | 6 | 7 | 0,20 |
| Brilho (à colheita) | 8 | 10 | 0,28 |
| Firmeza (à colheita) | 6 | 6 | 0,17 |
| RE (à colheita) | 7 | 10 | 0,28 |
| Pós-colheita (perdas "totais") | -2 | 10 | 0,28 |
| Sabor | 7 | 7 | 0,37 |
| Acidez | 6 | 9 | 0,47 |
| Facilidade de Colheita | 7 | 4 | 0,34 |
| Uniformidade drupas | 6 | 9 | 0,09 |
| Pescoço | 6 | 10 | 0,11 |
| Distr. Prod. (remont. vs. "2ª zona") | 40% | 4 | 0,32 |
| Comprimento restante para cana NR | 99 | 5 | 0,40 |
| Nº nós Remontantes | 19 | 3 | 0,12 |
| | | 133,00 | 5,3 |

Obs.:

Promising selections



4. Consumers requests



Quality analysis (Ranking)

External

12F37

13F82

Firmness

12F37₇

13F10

13F82

Cv-Sdt

13F38

13F79

13F66

2FC5₃

Color

12F37

2FC5₈

13F10

13F82

Cv-Sdt

13F79

13F38

13F66₄

Shining

12F37

13F82₇

Cv-Sdt

13F10

13F66

13F38

13F79

2FC5₄

Quality analysis (ranking)

Internal

12F37

13F82

Firmness

12F37₆

13F66

13F79

13F10

13F82

13F38

Cv-Sdt

2FC5₃

Acidity

13F79₆

13F66

13F10

13F82

Cv-Sdt

13F38

12F37

2FC5₂

Sweetness

Cv-Std₅

13F82

13F79

12F37

13F10

13F66

13F38

2FC5₂

Raspberry taste

13F82₆

13F66

13F10

13F79

Cv-Sdt

12F37

13F38

2FC5₃

GLOBAL Assessment

13F82₆

12F37

13F10

13F66

13F79

Cv-Sdt

13F38

2FC5₃

4. Consumers requests



| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------|---|---|---|---|---|---|---|----|----|----|----|
| Appearance | A | 0 | 0 | 1 | 0 | 0 | 4 | 9 | 14 | 6 | 2 |
| | B | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 11 | 14 | 3 |
| | C | 0 | 0 | 1 | 0 | 1 | 4 | 9 | 6 | 11 | 6 |
| | D | 0 | 0 | 1 | 4 | 6 | 5 | 4 | 3 | 9 | 4 |
| | E | 0 | 0 | 0 | 2 | 5 | 4 | 7 | 6 | 8 | 6 |
| Tasting | A | 0 | 1 | 1 | 4 | 3 | 8 | 5 | 10 | 4 | 1 |
| | B | 0 | 0 | 0 | 2 | 2 | 4 | 5 | 11 | 11 | 3 |
| | C | 0 | 0 | 2 | 0 | 2 | 6 | 7 | 8 | 8 | 4 |
| | D | 0 | 1 | 1 | 3 | 3 | 7 | 7 | 7 | 6 | 3 |
| | E | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 8 | 12 | 9 |
| Global | A | 0 | 0 | 0 | 4 | 4 | 6 | 8 | 11 | 3 | 1 |
| | B | 0 | 0 | 0 | 1 | 4 | 3 | 10 | 7 | 10 | 3 |
| | C | 0 | 0 | 1 | 1 | 2 | 7 | 6 | 10 | 8 | 2 |
| | D | 0 | 0 | 2 | 3 | 5 | 5 | 8 | 5 | 6 | 2 |
| | E | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 9 | 10 | 6 |

5. Breeders problems

Crumbly fruit



root buds



Fruit color

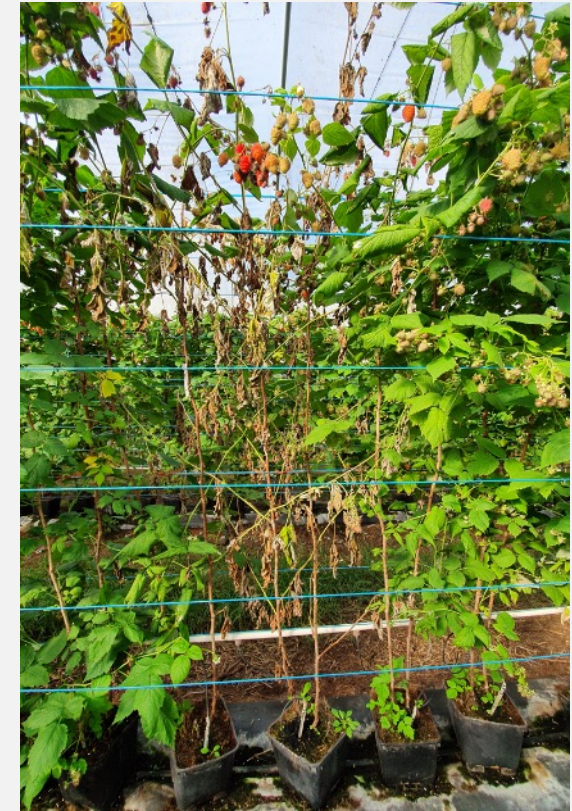


Rust



Spider mites

Collapses



5. Breeders problems



Aphides



"Double fruit"

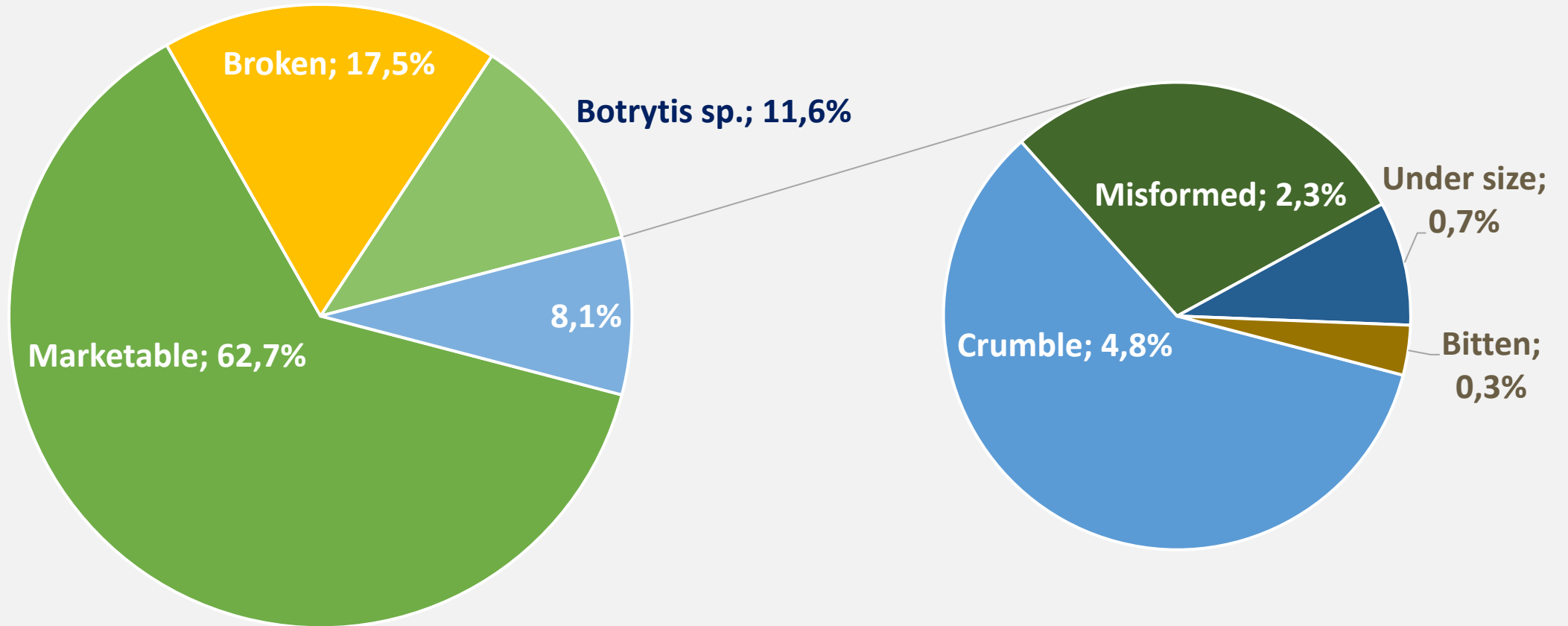


**Lateral
development**



**Receptacle
shape**

Unmarketable fruit causes



Are growers and consumers the driven force for *Rubus* breeding?

Growers

- Are they ready to pay for breeding?
- Are they well organized to assume the same breeding goals?
- How far are they prepare for new production systems?
- Do they accept reductions on yield for a more sustainable production?

Consumers

- How to define the average consumer? Do retailers represent consumers?
- Consumers preferences change with time. What is the life expectation for a cultivar? Bigger berries? pink color? peach flavor?
- Which quality parameter is the most important? Darker fruit?

Are growers and consumers the driven force for *Rubus* breeding?

Breeders

- What should breeders do?
 - Breed for productivity?
 - Breed for a specific market?
 - Breed for a specific production system?
 - Breed for pest and diseases resistance?
 - Breed for less agrochemical inputs?
 - Breed for more resilient genotypes?
 - Breed for longer shelf life?
 - Breed for better taste berries?

**Participative breeding is the most suitable program for
Growers, Retailers and Consumers!**

The breeding team

INIAV, I.P.

- Selection – Francisco Luz – PhD student **Ok!**
- Crosses – Cândida Trindade – INIAV Technician; **Ok!**
- Breeding Plan – Teresa Valdiviesso – INIAV Researcher; **Ok!**
- Breeding and Protocol Manager – Pedro Brás de Oliveira – INIAV Researcher; **Ok!**

Beirabaga

- Breeding team – Francisco Luz – Technician; **Ok!**
- Field advance selections performance – Sofia Guerreiro – Field technician; **Ok!**
- Quality and market performance – Sofia Horgan – Sales Director; **Ok!**
- Financial and strategical decisions – David Horgan – Manager; **Ok!**

