

# JUVENILITY IN HORTICULTURAL PLANTS

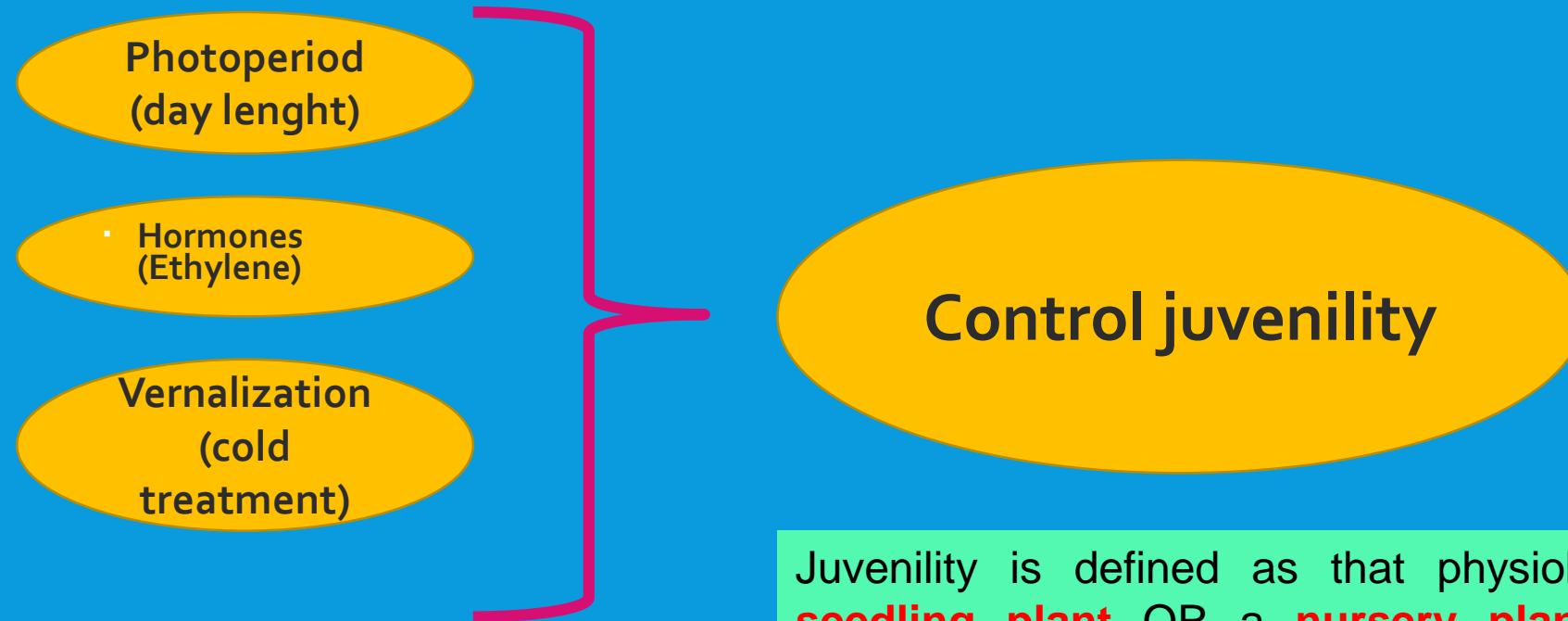
# WHAT IS JUVENILITY???

Flowering is essential to fruit production.  
Each species need certain of time to form flower.

- Juvenility: plant size or maturity for production flower and fruit
- *A young stage of plant development in which plants from seed are not capable of flowering.*
- It is possible to see juvenility in:
  - 1- Seedling plants (Seedlings)
  - 2-Nursery plants (**Saplins is not true!!!!**) **Mostly for fruit species and grape**
- During juvenility period, they will not produce flower and it will not be possible to have yield.

Transition  
period to  
generative  
maturity

# CONTROL



Juvenility is defined as that physiological state of a **seedling plant** OR a **nursery plant** during which it cannot be induced to flower. This state is followed by a transition phase in which flowering can occur but not as readily as later when the plant grows into the adult phase.

# WHAT ARE SEEDLING PLANT AND NURSERY PLANT?



Seedling



## • Nursery plants

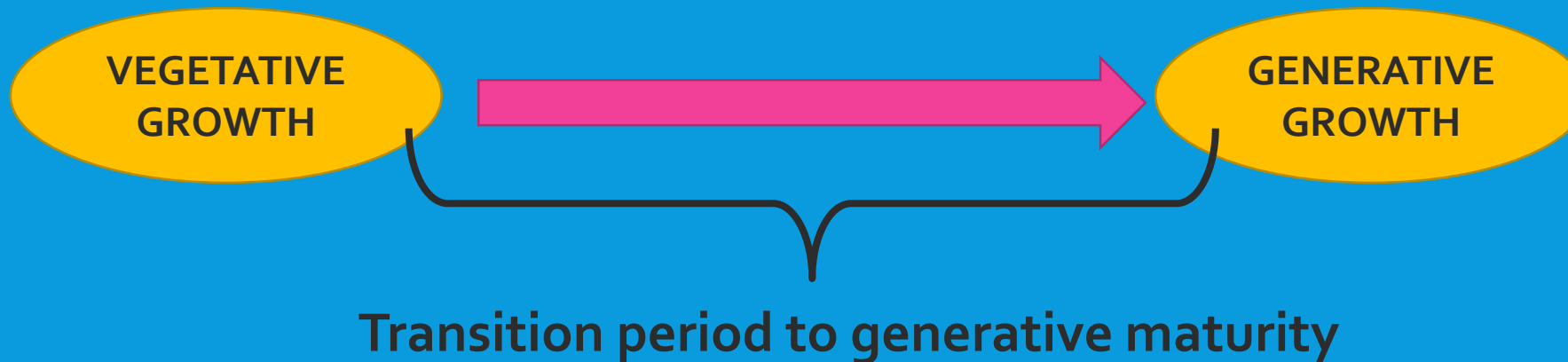


**Perennial species  
Mostly grafted plants**

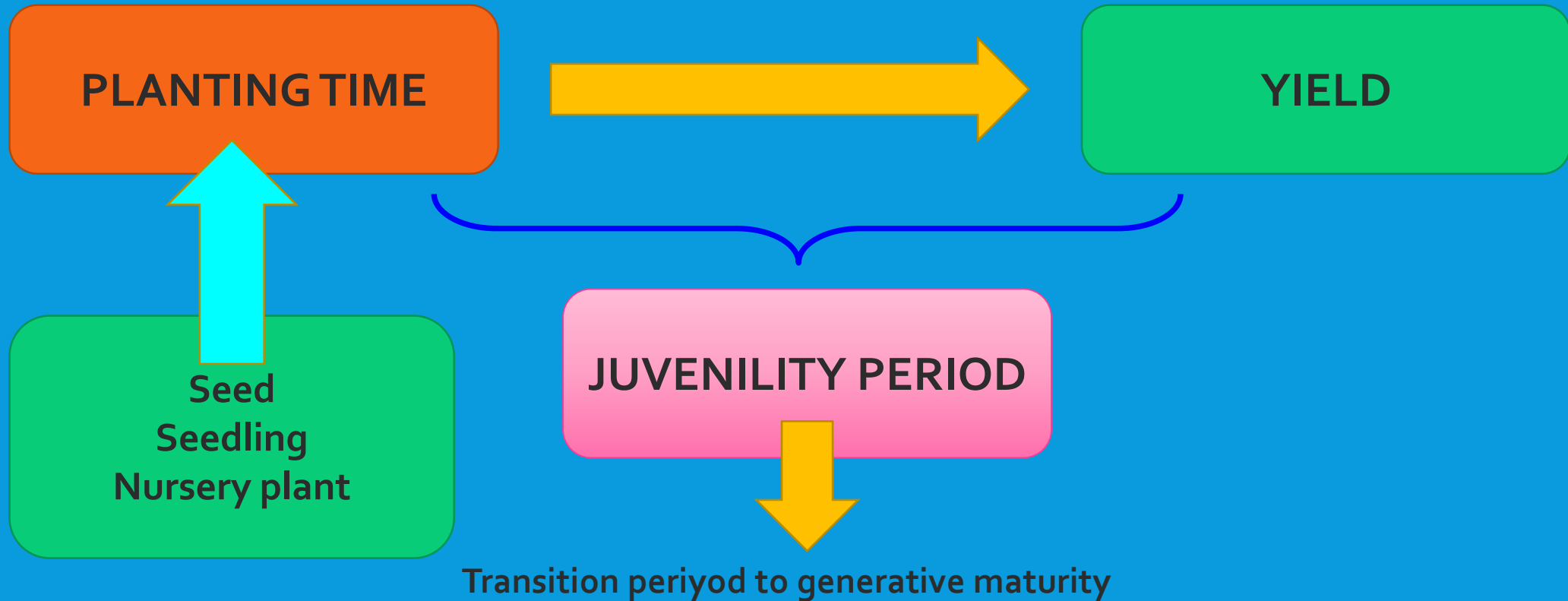


# FLOWER= A GENERATIVE ORGAN

- Mostly, a flower is responsible for a fruit production.
- Its mission is perpetuation of plants.
- Plants can become productive by forming flowers at some point in their lives.
- **REMEMBER BEFORE FLOWER WE NEED A BUD DIFFERENTIATION !!!**



# FOR FRUIT TREES OR VEGETABLE SPECIES



# TRANSITION TIME TO GENERATIVE MATURITY

- Juvenility period of woody plants CAN lasts many years.
- For most herbaceous perennials usually less than one year.

<b>Plants</b>	<b>Species</b>	<b>Juvenility period</b>
Annual or biennial herbaceous plants	Tomato, cabbage, strawberry	In the 1. or in the 2. year after planting
Perennial woody plants	Fruit trees	In the 2. (apple) or 7. (pistachio nut) year



- Herbaceous perennials

Juvenile stage



Mature stage



# FACTORS AFFECTING JUVENILITY PERIOD??

- 1. Species or cultivar (genetical factors, floral organ trait genes)
- 2. Environmental conditions (temperature, rain, light)
- 3. Cultural practices (pruning, fertilization etc.)

In woody plants, the juvenile phase may be very short or very long depending upon both environmental and genetic factors. The juvenile period can often be shortened by increasing the growth rate of the young seedling, because a minimum size must be attained to reach the adult state

An extreme example of this is alpine trees (such as oak, beech, elm ) and shrubs more than 100 years old that remain juvenile because slow growth has prevented their reaching the required minimum size.

# WHAT HAPPENS JUST BEFORE GENERATIVE MATURITY???

The vegetative stem primordia is transformed into the floral primordia, which forms the base of the floral organ before developing into the floral tissues. The complex process of floral development arises in response to the integration of signals from the external environment and internal factors , e

- 1. The vegetative meristematic cells in the buds convert to generative (floral) meristematic cells.
- 2. This conversion occurs during two different stages in perennial woody horticultural plants such as grape, apple, pear, apricot, sweet cherry.
- These stages are:
  - 1. Physiological transition stage
  - 2. Morphological transition stage

**These stages are irreversible and floral parts will continue development until anthesis.**

# PHYSIOLOGICAL TRANSITION STAGE

- We can not see this stage from outside
- We accept the occurring of this stage
- At this time subtle biochemical changes take place that dramatically alter the pattern of differentiation from leaf, bud, and stem tissue to the tissues that make up the reproductive organs, e.g., pistil and stamen, and accessory flower parts, e.g., petals and sepals.
- **1. A meristem has been biochemically signaled to change from the vegetative to the reproductive state. (These are microscopic changes in its configuration become apparent.**

# TIME OF PHYSIOLOGICAL TRANSITION STAGE DURING THE YEAR

**Factors affecting time of physiologically transition stage:**

## 1. Genetical structure (Species, cultivars, genotype)

Apple	At the beginning of summer period
Apricot	At the end of summer period
Peach	In the middle of summer
Strawberries	In August and September

Cultural practices

❖ Insufficient leaves area on the tree for satisfactory photosynthesis because of pest and disease etc.  
❖ Lack of irrigation  
❖ Poor nutritional value in the soil etc.

C/N balance



## ▪ 2. Ecological factors

- Temperature
- Rainfall
- Exposure to sun light , length of day (photoperiodism)

## ▪ 3. Cultural practices applied before occurring stage

- Plant growth regulator applications stimulated early flowering
- Ringing or Girdling (Girdling, also called ring-barking, is the complete removal of the bark (consisting of cork cambium or "phellogen", phloem, cambium and sometimes going into the xylem) from around the entire circumference of either a branch or trunk of a woody plant.)

**Carbohydrate-Nitrogen Relationship in plant???**

# MORPHOLOGICAL TRANSITION STAGE

**Morphological differentiation in buds.**

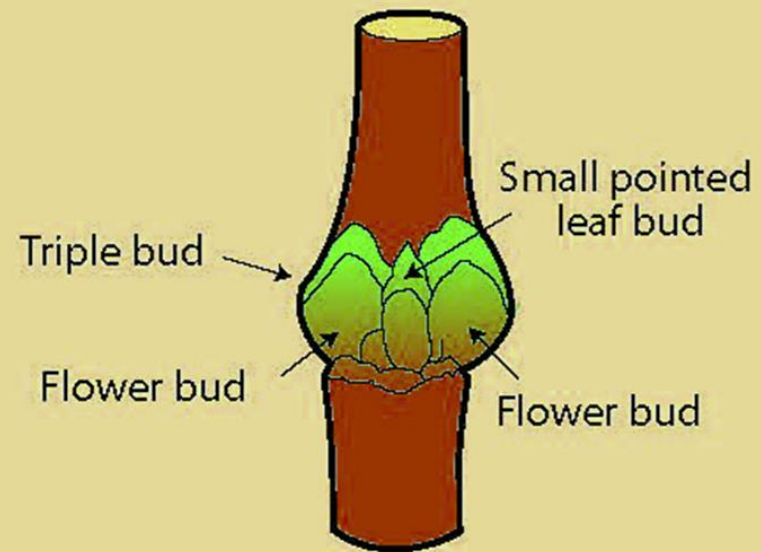
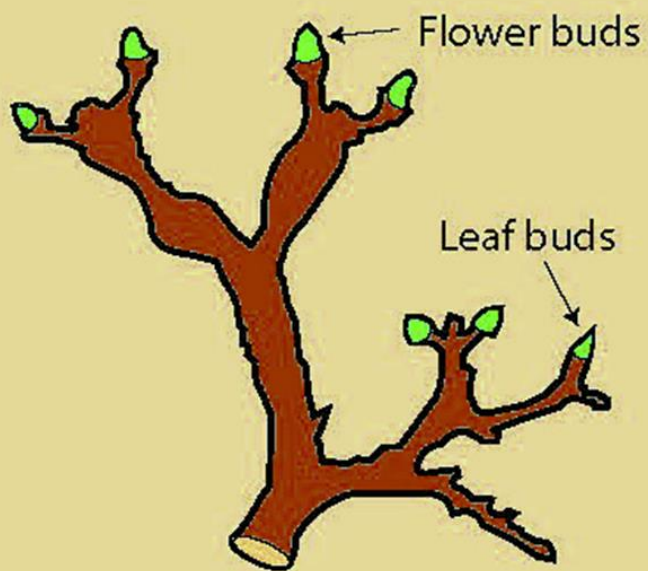
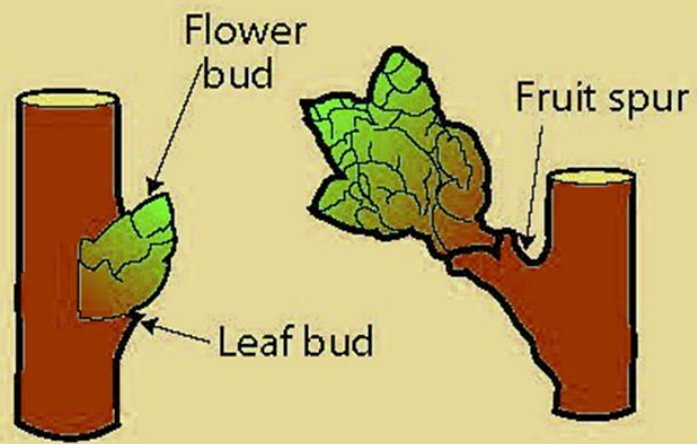
**It is visible to the naked eye.**

**Flower buds take a flat and wide shape.**

**These are the events that follow initiation;**

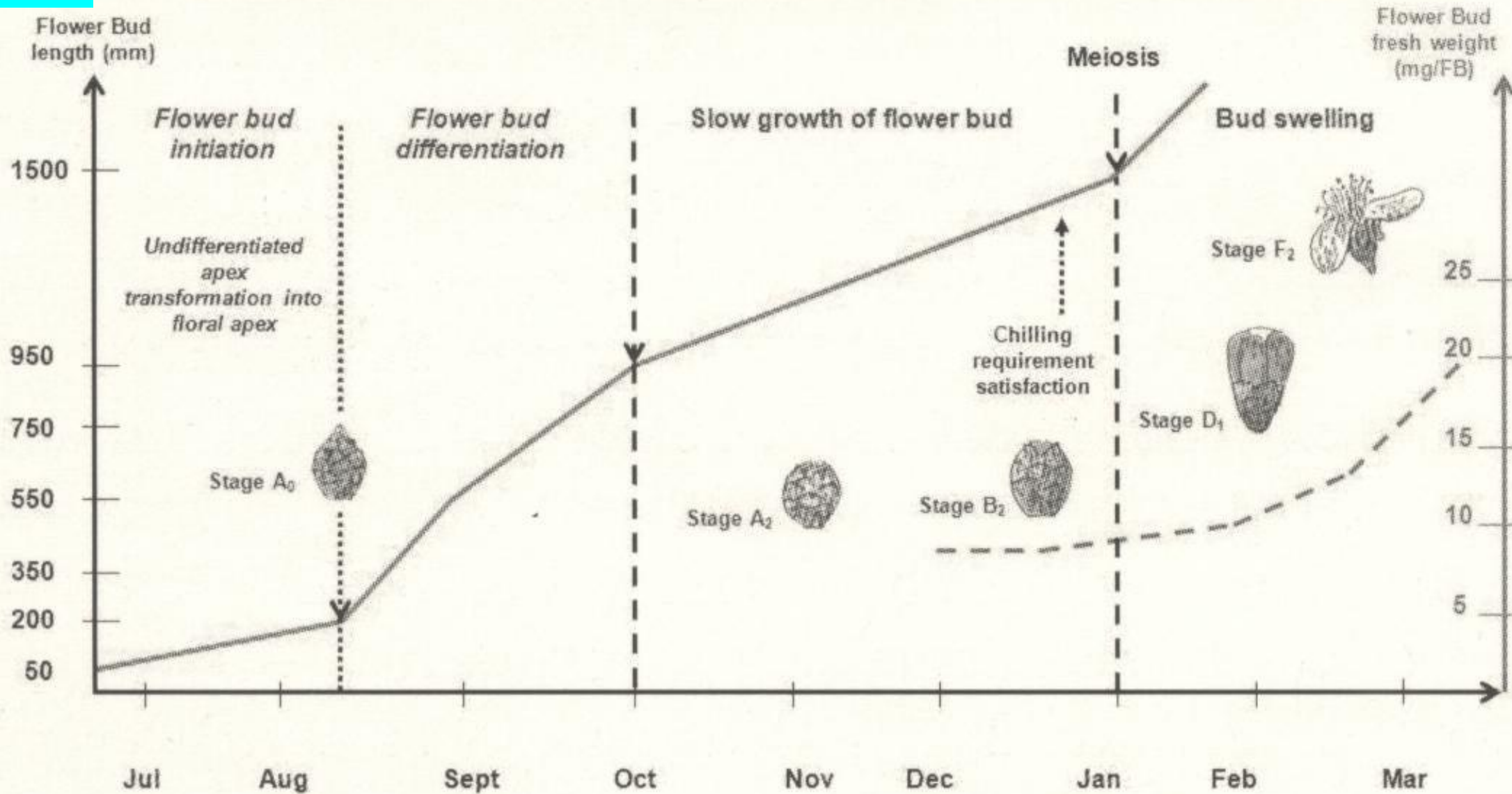
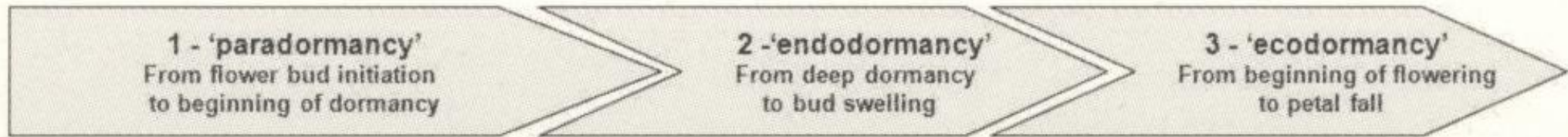
- 1. Development of the individual floral parts,**
- 2. Floral maturation**
- 3. All of these events continue until the anthesis.**







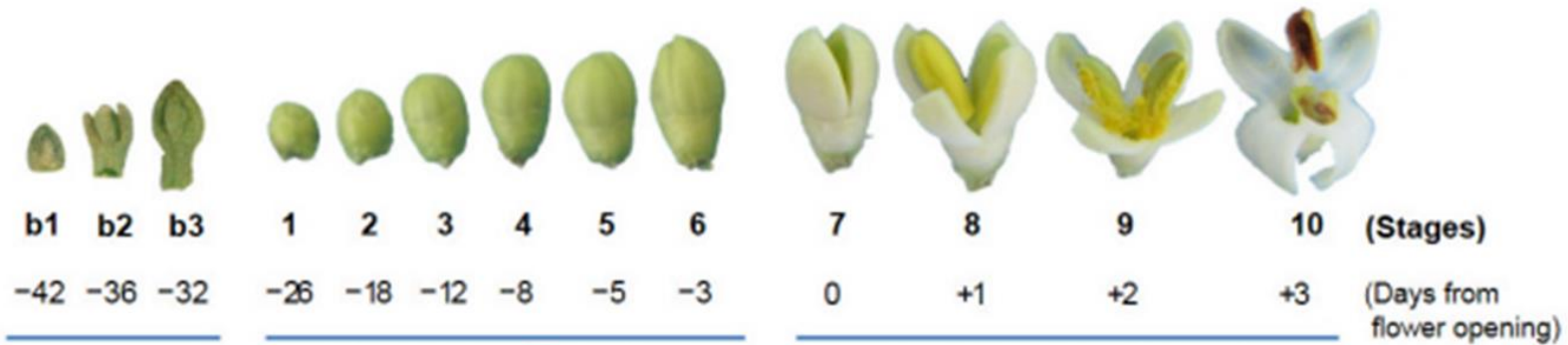
# Flower bud differentiation in apricot





# STAGES OF OLIVE FLOWERS

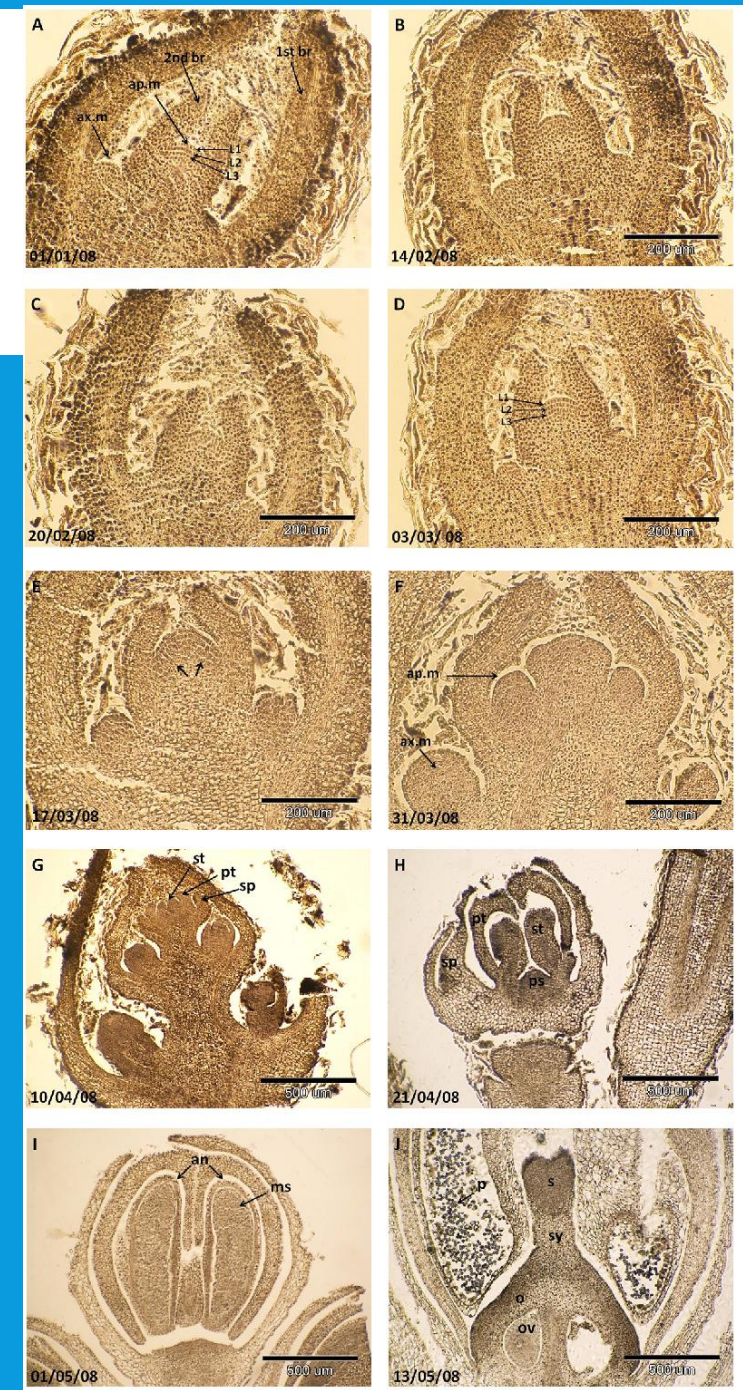
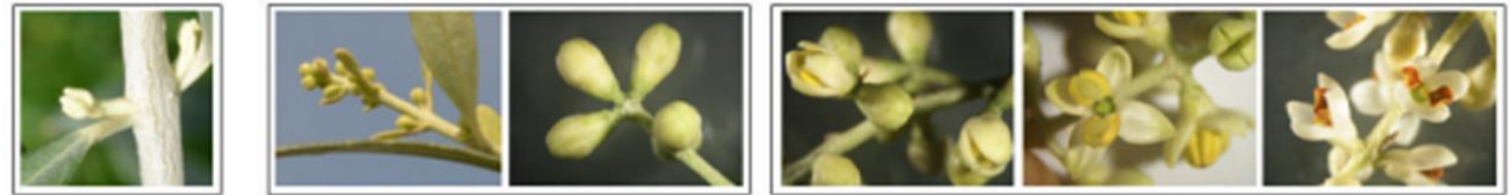
- Variation in flower bud differentiation and progression of floral organs with respect to crop load in olive



cv. Leccino  
**Inflorescence buds**

cvs. Leccino and Dolce Agogia  
**Flowers in pre-anthesis**

cvs. Leccino and Frantoio  
**Flowers at anthesis**



# WHAT WILL HAPPEN AFTER MORPHOLOGICAL TRANSITION STAGE

- In most plants, once the transformation from the vegetative to the reproductive state has been made, the process is irreversible.
- The floral parts will continue development until anthesis
- Anthesis: is the point at which the flower is fully open (=Flowering) even though the environmental conditions that existed during initiation are changed.
- By the time anthesis takes place, meiosis has already occurred, and pollen and embryo-sac development are complete. At this stage the plant is prepared for the next major step in its development; fruiting.



