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Devernalization

- The reversion of vernalization by high temperature treatment is called devernalization.
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Hormonal theories

- Melcher (1939)
- He proposed that chilling treatment induces the formation of a new floral hormone called vernalin.
- This hormone is transmitted to other parts of the plant.
- He grafted a vernalized plant with an unvernallized plant.
- The unvernallized plant also initiates flowering.
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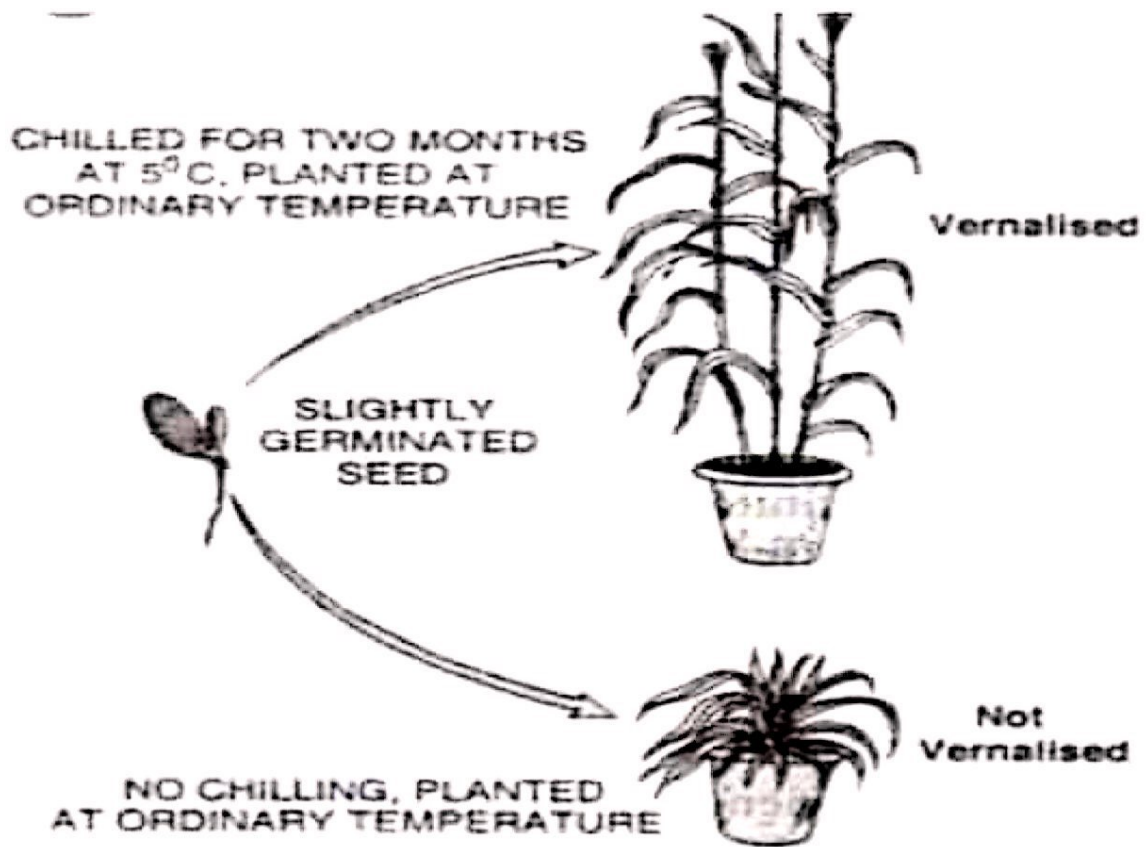


Fig. 15.33. Experiment to show effect of vernalization on Winter Rye.

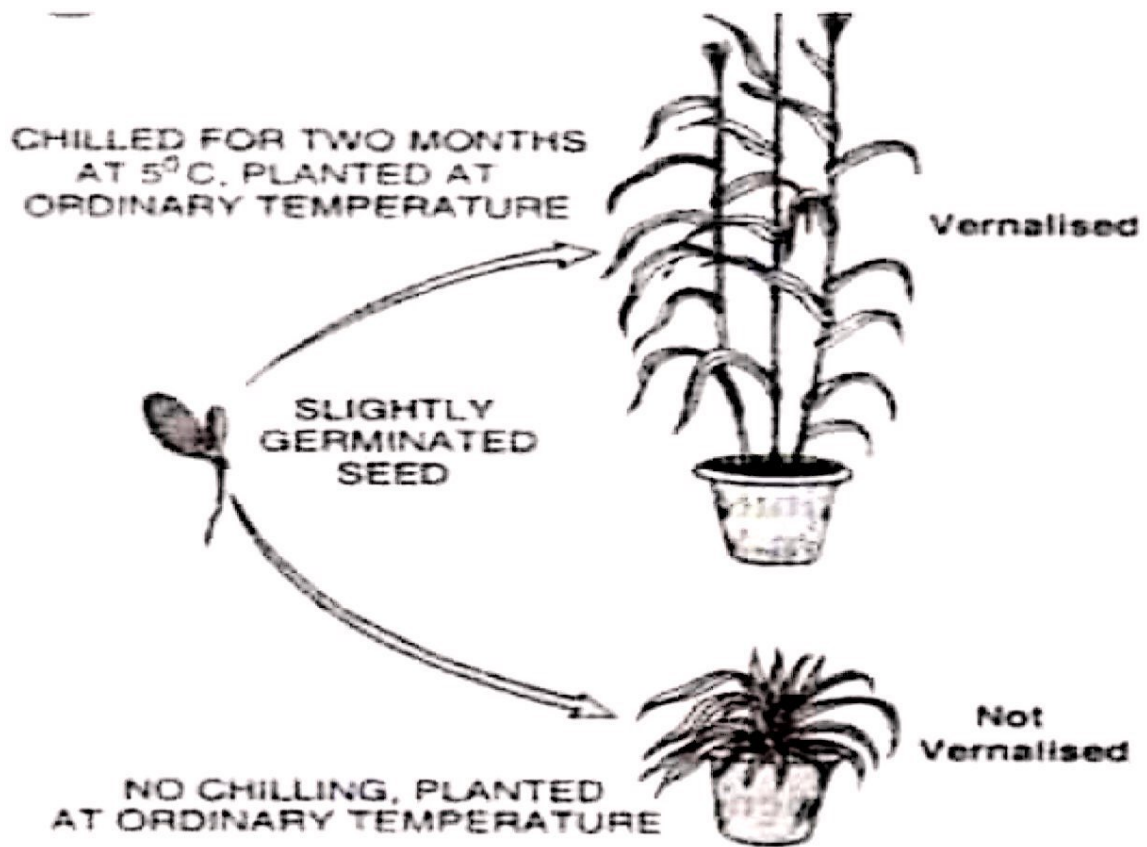


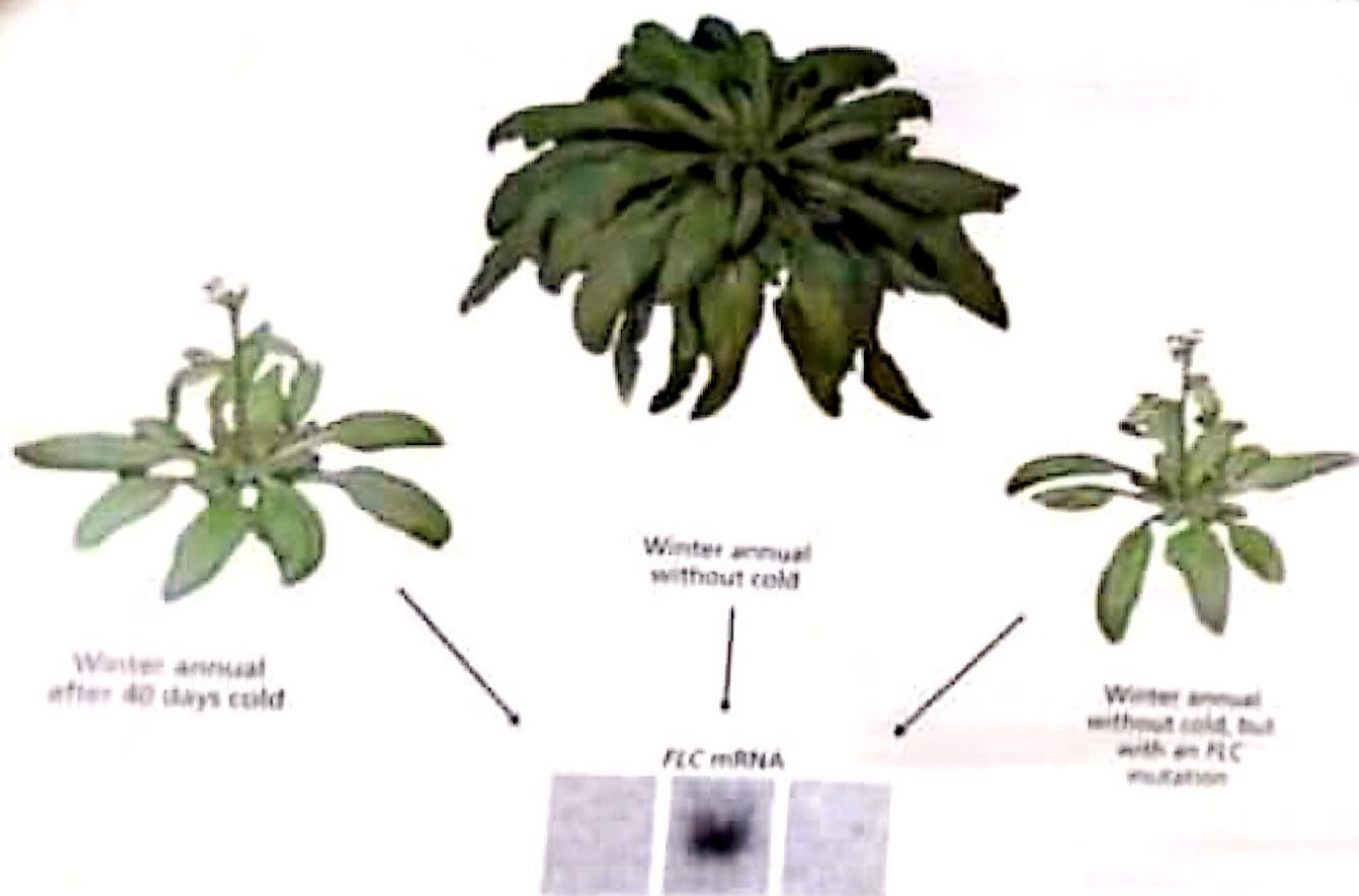
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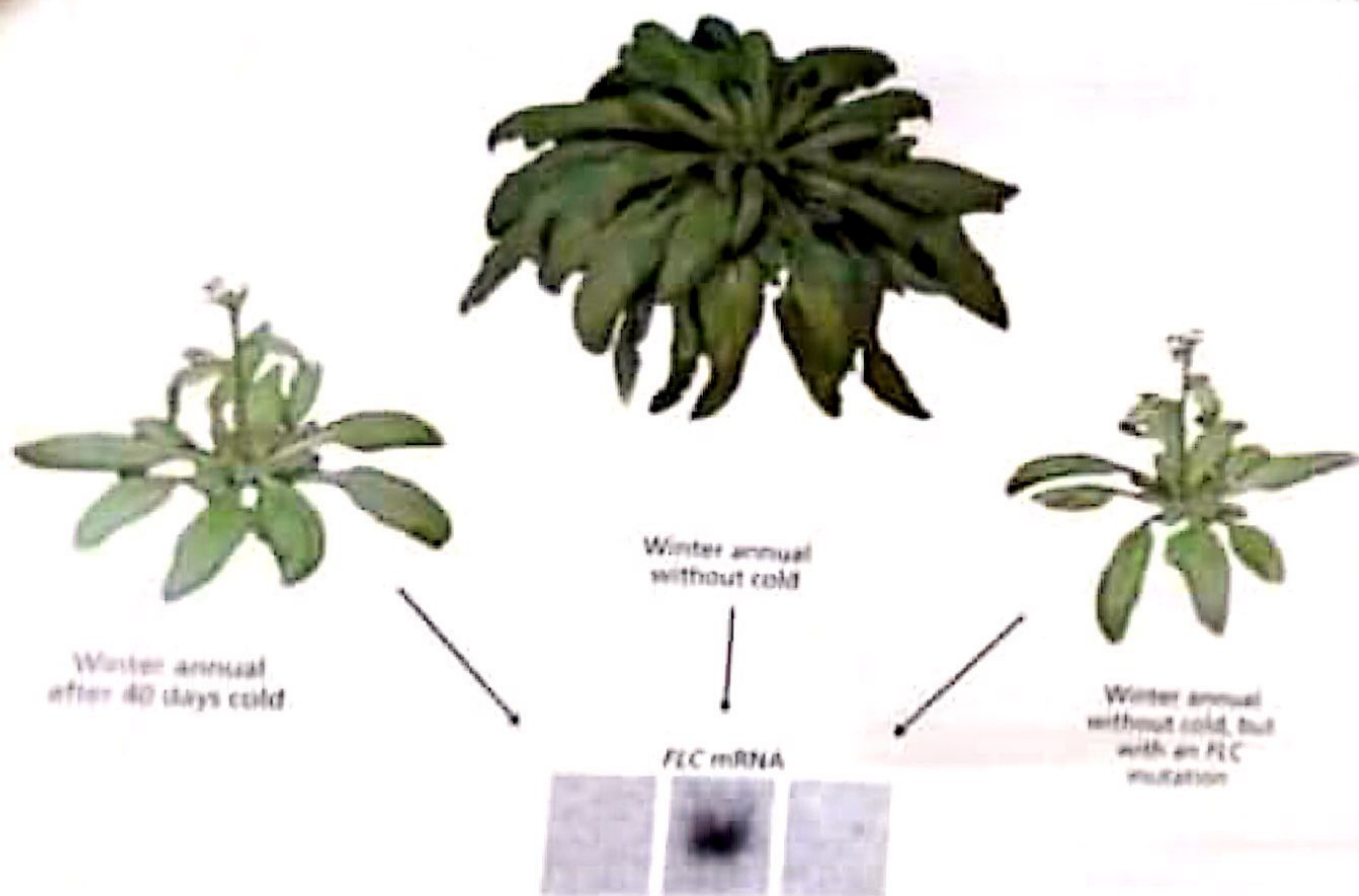
❖ Content

- **Introduction**
- **Technique of vernalization**
- **Vernalization and flowering**
- **Mechanism of vernalization**
- **Devernalization**
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 - They bear flowers and fruits in summer.

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- If they are sown in the spring along with the spring variety, they grow vegetatively but fail to produce ears or flowers.
- **Exposure to low temperature of the winter is evidently essential for the flowering of winter varieties.**
- It has been shown by several workers that this requirement of low temperature in nature can be satisfied artificially in laboratories in the absence of the winter season and the plant may be made to flower in summer season.

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- Vernalization is, therefore, a process of shortening of the juvenile or vegetative phase and hastening flowering by a previous cold treatment.

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Two theories..

- 1. Phasic development theory
- 2. Hormonal theories.

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VERNALIZATION

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**Winter-annual Arabidopsis
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- Vernalization May Involve Epigenetic Changes in Gene Expression.
- Changes in gene expression that are stable even after the signal that induced the change (in this case cold) is removed are known as **epigenetic regulation**.
- One model for how vernalization affects flowering is that there are stable changes in the pattern of gene expression in the meristem after cold treatment.
- The involvement of epigenetic regulation in the vernalization process has been confirmed in the LDP *Arabidopsis*.
- A gene that acts as a repressor of flowering has been identified: **FLOWERING LOCUS C (FLC)**. *FLC is highly expressed in nonvernalized* shoot apical meristems (Michaels and Amasino 2000).
- After vernalization, this gene is epigenetically switched off by an unknown mechanism for the remainder of the plant's life cycle.

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- in many plants the flowering is influenced not only by the correct photoperiod but also by temperature.
- In annuals the flowering is primarily affected by the photoperiod.
- The effect of temperature is secondary to light, a biennial plant, on the other hand, grows only vegetatively during the first season and will not initiate.
- Flowering until it has been exposed to prolonged period of low temperature of the winter.
- The term vernalization was coined by **T.D.Lysenko** in **1920s**.
- Other important scientists who have contributed to the study on vernalization were **F.G.Gregory** and **O.N.Purvis (1961)**.

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- Proposed by Lysenko in 1934.
- According to this theory there is a series of phases in the development of a plant.
- Each phase is stimulated by an environmental factor such as temperature, light, etc.
- Commencement of one phase will take place only after the completion of the preceding phase.
- There are two phases
- 1. Thermophase
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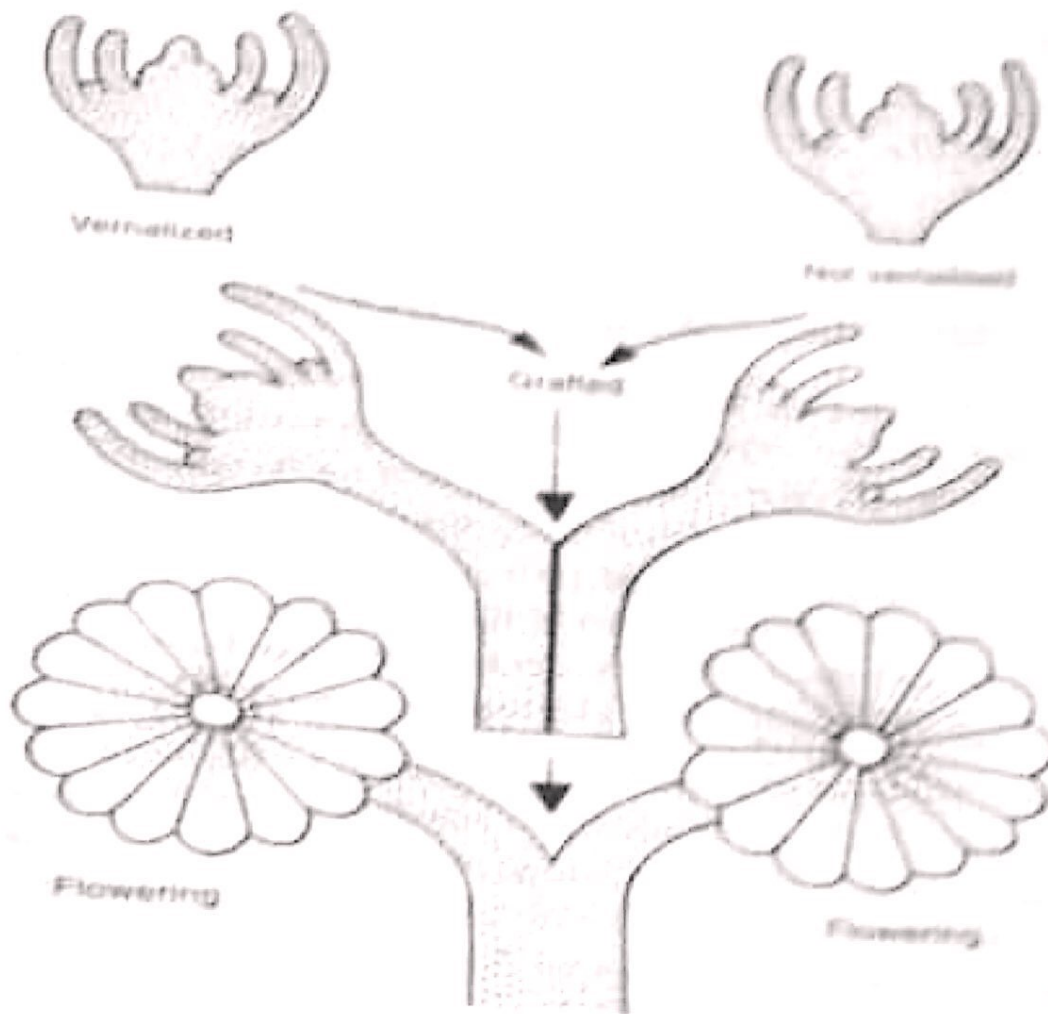
- **A similar phenomenon is to be seen in certain varieties of cereals.**
- **In cold countries, there are cereals of two physiological kinds –the winter cereals and the spring cereals.**
- **The winter variety is sown in early autumn i.e. in the month of September or October to make them flower in the following summer.**

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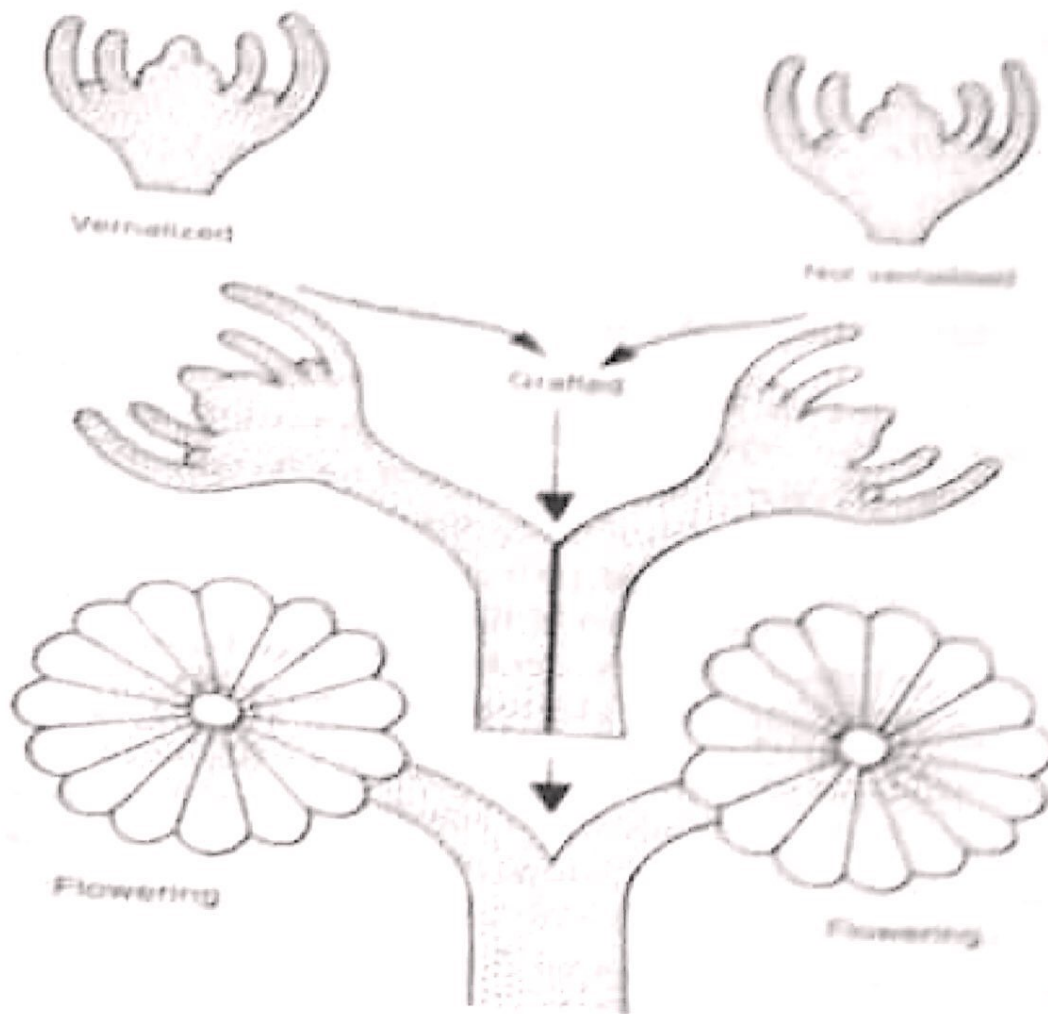
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- The condition occurs in winter varieties of some annual food plants (e.g., Wheat, Barley, and Rye).
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- They germinate and over winter as small seedlings , resume growth in spring , and harvested usually about mid summer.
- The over wintering cold treatment , or vernalization , renders the plants sensitive to long day.
- If seeds of the winter strain are sown in the fall , however, the germinated seedlings are subjected to an over wintering low temperature treatment.

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❖ Importance of vernalization

- (i) Vernalization can help in shortening the juvenile or vegetative period of plant and bring about early flowering. It is not only applicable to temperate plants but also to some tropical plants, e.g., Wheat, Rice, Millets, Cotton,**
- (ii) It increases yield, resistance to cold and diseases, and**
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