

## Senescence.

(14)

The deteriorative processes which naturally terminate the functional life of an organ or an organism are collectively called senescence. The photosynthetic deterioration of leaves during the autumn before abscission is a senescence phenomenon. Robertson (1923) has defined senescence as the period during which growth rate recedes after the grand period of growth.

Some types of senescence show that in annual grains, the entire plant dies by some systematic function. In perennial herbs, the above ground portions may die, but the root system and underground system remain viable. Senescence may develop into several patterns in plants as



Overall senescence



Top Senescence



Deciduous Senescence

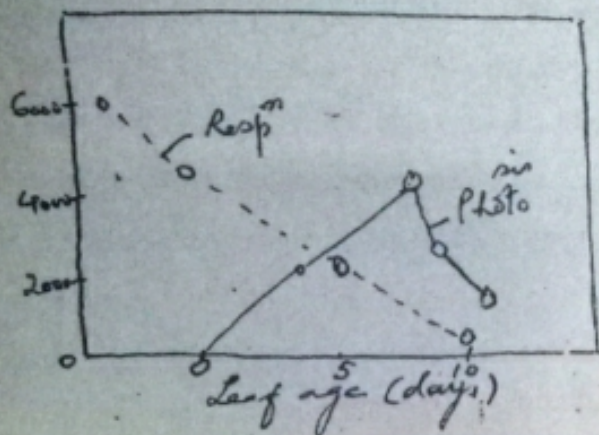


Progressive Senescence

- (i) Overall death of the plant.
- (ii) The senescence of only the ~~stem~~ aboveground parts.
- (iii) The deciduous habit of leaf senescence,
- (iv) The progressive senescence of leaves up the stem.

The leaf is at its peak of photosynthetic effectiveness at or just before the time it completes its most rapid period of expansion. The remaining of its normal existence is a deteriorative time, with gradually lowering deficiency of photosynthesis until the leaf is shed from the plants. The decline in photosynthetic rates starts soon after a leaf reaches full size and the decline continues until the leaf reaches a stage of senescence as shown by yellow colored leaves of beans. The senescence leaf cannot even photosynthesize enough to maintain its dry wt. Similarly there is a decline in respiratory ability of leaves. In some fruit species, however, the respiratory activity of leaves is raised when they reach a state of senescence.





سٹوڈنٹ فوٹو سٹیشن  
لیاقت ہال زرعی یونیورسٹی فیصل آباد  
0321-7338587

In dark the yellowing feature of senescence developed much more rapidly in older leaves than in younger leaves. It also showed a programme<sup>essive</sup> decline in the protein-1 content, chlorophyll contents, RNA and assimilative power of the leaves. There is also a general hydrolysis of CHO components and losses of organic Acids. The rate of leaf senescence is altered by factors as elevated temp., darkness, and H<sub>2</sub>O deficit.

#### Theories of Senescence.

Molisch (1938) proposed that the reproductive activities of the plant, namely, the filling of the fruits, depleted the remainder of the plant of its nutrients, thus imposing senescence. Similarly it was shown that the developing inflorescence caused a marked depletion of nitrogenous materials in the other plant parts especially in the leaves.

Leopold et.al., (1959) concluded that the development of male flowers on male plants induces senescence fully as effectively as the development of fruits on female plants, and removal of the male structures defers senescence.

Structural integrity within the aging organs may deteriorate and cause senescence. There may also develop an actual toxifying effect of tissues with aging, and this may contribute to the senescence development.



vinetin, when applied to localised parts of leaves, stimulates mobilization of  $CHO$ , amino acids, and various inorganic ions from untreated zones. Treated leaves remain green, and their protein contents do not fall in the manner of the normally senescing leaves. The ability of <sup>kinetin</sup> ~~vinetin~~ and related compounds to defer senescence is the basis for commercial treatment of some green vegetables to improve their storage life.

Abscission: (Flowers, fruits, leaves drop).

Plants - Deciduous, Evergreen.

Before abscission of a plant organ, a layer of tissue is usually formed at the base of the organ abscission zone. Cells in the abscission zone are thin walled and almost completely lacking in lignin and suberin. In most cases a series of cell division precedes abscission.

The dissolution phenomenon which causes abscission:

1. In some cases middle lamella dissolves between two layers of cells, the primary wall remaining intact.
2. The primary wall and middle lamella both may dissolve.
3. In a few examples, whole cells have dissolved.

Factors which lead to Abscission:

It is a well known fact that removal of a leaf blade will cause abscission of the petiole in a short period. The site of auxin production is the leaf blade from which auxin is transported through the petioles to stem. In young leaf blades, the auxin conc<sup>n</sup> is high as compared to the petiole but as the leaf ages, the auxin contents decrease. In a simple but inventive series of experiments Addicot and Lynch demonstrated that the most important factor controlling abscission is the auxin gradient across the abscission zone. Application of IAA in <sup>linolen</sup> ~~linolen~~ paste to either the proximal or distal end of a debled bean leaf petioles has a profound effect on the rate of abscission. Proximal application accelerates rate of abscission and distal application retards it.

(Distal: Situated away from the point of origin or attachment)  
(Proximal: Situated toward the point of origin or attachment)

