**Discovery of ABA**

In 1963, a substance strongly antagonistic to growth was isolated by Addicutt from young cotton fruits and named Abcisim II. Later on, this name was changed to Absicisic acid (ABA).

Wareing et al (1963, 64) at the same time pointed out the presence of a substance in birch leaves which inhibited growth and induced dormancy of buds and therefore, named it **dormin**. But, very soon as a result of the work of cornforth et al, it was found to be identical with abscisic acid.

**Physiological roles of ABA**

1. **Stomatal Closing**

The role of ABA is causing stomatal clouser in plants undergoing water-stress is now widely recognised.

It has been suggested by various workers that in response to the water-stress, the permeability of the chloroplast membranes of mesophyll cells to ABA is greatly increased. As a result, the ABA synthesized and stored in mesophyll chloroplasts diffuses out into the cytoplasm. It then moves from one mesophyll cell to another through plasmodesmata and finally reaches to the guard cell where it causes closing of stomata. Fresh biosynthesis of ABA continues in mesophyll chloroplasts during period of water-stress.

When water potential of the plant restored, the movement of ABA into the guard cells stops. ABA disappears from the guard cells a little later.

The application of exogenous ABA to leaves of normal plants causes closing of stomata within a few minutes.

It has been suggested that ABA causes closing of stomata by inhibiting the ATP-mediated H+/K+ ions exchange pumps in guard cells.

1. **Other Effects**

ABA has also been shown to play some role in

1. Inducing bud dormancy in some temperate zone plant such as birch (*Betula* *pubescens*), Acer, fraxinus etc.
2. Inducing dormancy of seeds which require stratification (i.e., exposour to low tempfor germination)
3. Process of tuberization
4. Fruit ripening
5. Abscission of leaves, flowers and fruits
6. Senescence of leaves
7. Increasing the resistance of temperate zone plants to frost injury
8. Inhibition of GA-induced synthesis of α-amylase in aleurone layer of germinating barley
9. Inhibition of precocious germination and vivipary and
10. Increase in root: shoot ratio at low water potentials

**Biosynthesis of ABA in plants**

Extensive studies done by researchers with ABA deficient mutants of tomato, Arabidopsisand other plants have clearly shown that ABA is synthesized in higher plants not from simple terpenoid precursors directly through 15-C farnesyl diphosphate (FPP), but indirectly through carotenoid pathway as breakdown product of 40-C xanthophyll such as violaxanthin or neoxanthin .

* The initial steps of BA biosynthesis take place in chloropalsts or other plastids while final steps occur in cytosol
* Violaxanthin is synthesized from zeaxanthin (also a 40-C xanthophylls) in a reaction that is catalysed by the enzyme zeaxanthin epoxidase (ZEP). This enzyme is encoded by ABA1 locus of *Arabidopsis*.
* Violaxanthin is converted into 9’-cis-neoxanthin. The latter is then cleaved into 15-C compound xanthoxal and a 25-C epoxy aldehyde in the presence of the enzyme 9.-cis-epoxycarotenoid dioxygenase (NCED).
* Xanthoxal is finally converted into ABA in cytosol via two oxidation steps catalysed by the enzymes aldehyde oxidases involving abscisyl aldehyde as intermediates. The enzymes aldehyde oxidases require MO as cofactor

