



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

ALLELOPATHY

Allelopathy is the detrimental effects of chemicals or exudates produced by one (living) plant species on the germination, growth or development of another plant species (or even microorganisms) sharing the same habitat.

Allelopathy does not form any aspect of crop-weed competition, rather, it causes CropWeed interference, it includes competition as well as possible allelopathy.

Allelo chemicals are produced by plants as end products, by-products and metabolites liberalised from the plants; they belong to phenolic acids, flavanoides, and other aromatic compounds viz., terpenoids, steroids, alkaloids and organic cyanides.

Allelopathic Effect of Weeds on Crops

(1) Maize

- Leaves & inflorescence of Parthenium sp. affect the germination and seedling growth
- Tubers of Cyperus esculentus affect the dry matter production

(2) Sorghum

- Stem of Solanum affects germination and seedling growth
- Leaves and inflorescence of Parthenium affect germination and seedling growth

(3) Wheat

- Seeds of wild oat affect germination and early seedling growth
- Leaves of Parthenium affects general growth
- Tubers of C. rotundus affect dry matter production
- Green and dried leaves of Argemone mexicana affect germination & seedling growth

(4) Sunflower

- Seeds of Datura affect germination & growth

Allelopathic Effect of crop plants on weeds

- (i) Root exudation of maize inhibits the growth of Chenopodium album
- (ii) The cold water extracts of wheat straw when applied to weeds reduce germination and growth of Abutilon sp.

Allelopathic effect of weeds on weeds

- Extract of leaf leachate of decaying leaves of *Polygonum* contains flavonoides which are toxic to germination, root and hypocotyls growth of weeds like *Amaranthus spinosus*
- Inhibitor secreted by decaying rhizomes of *Sorghum halepense* affect the growth of *Digitaria sanguinalis* and *Amaranthus* sp.

Factors influencing allelopathy

a. Plant factors

- Plant density: Higher the crop density the lesser will be the allelo chemicals it encounters
- Life cycle: If weed emerges later there will be less problem of allelochemicals
- Plant age: The release of allelochemicals occurs only at critical stage. For eg. in case of *Parthenium*, allelopathy occurs during its rosette & flowering stage.
- Plant habit: The allelopathic interference is higher in perennial weeds.
- Plant habitat: Cultivated soil has higher values of allelopathy than uncultivated soil.

b. Climatic factors: The soil & air temperature as well as soil moisture influence the allelo chemicals potential

c. Soil factors: Physico-chemical and biological properties influence the presence of allelochemicals.

d. Stress factors: Abiotic and Biotic stresses may also influence the activity of allelochemicals

Mechanism of action of allelochemicals

- Interfere with cell elongation
- Interfere with photosynthesis
- Interfere with respiration
- Interfere with mineral ion uptake
- Interfere with protein and nucleic acid metabolism

Use of Allelopathy in biological control of weeds:

1. Use of cover crop for biological control
2. Use of alleopathic chemicals as bio-herbicides