



**Centurion
UNIVERSITY**

*Shaping Lives...
Empowering Communities...*

8. Concept of Adjuvant, Surfactant, Herbicide Formulation and their Use



**Centurion
UNIVERSITY**

*Shaping Lives...
Empowering Communities...*

8.1 Adjuvant

Adjuvants are chemicals employed to improve the herbicidal effects, sometimes making a difference between satisfactory and unsatisfactory weed control.



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities

8.1.1. Surfactant (Surface active agents)

(a) Aid in wetting the waxy leaf surface with aqueous herbicide sprays (wetting agents)

(b) In spreading the hydrophilic herbicides uniformly over the foliage (spreaders)

(c) In the penetration of herbicide into the target leaves and stems (penetrates)

A water drop is held as a ball on a waxy leaf surface. (Take water in a beaker, if you dip a leaf of *Cynodon dactylon* and pull it back, you can see the leaf without wetting. But if you add a drop of surfactant you can readily wet the foliage.). With the addition of surfactant, the water drop flattens down to wet the leaf surface and let the herbicide act properly.



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities

8.1.2. Stabilizing agents

These include

(i) Emulsifiers: A substance which stabilizes (reduces the tendency to separate) a suspension of droplets of one liquid which otherwise would not mix with the first one. It substitutes for constant agitation of spray liquids during field operation.

Eg., ABS, Solvaid, 15-5-3, 15-5-9.

(ii) Dispersing agents: They stabilize suspensions. They keep fine pesticides of wettable powder in suspension in water even after initial vigorous agitation has been withdrawn. They act by increasing the hydration of fine particles of WP laden with the herbicides.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

8.1.3. Coupling agents (Solvents and co-solvents)

Chemical that is used to solubilize a herbicide in a concentrated form; the resulting solution is soluble with water in all proportions. Eg., 2,4-D is insoluble in water, but it can be dissolved in polyethylene glycol to make it water soluble

8.1.4. Humicants (Hygroscopic agents)

Humicants prevent rapid drying of herbicide sprays on the foliage, thus providing an extended opportunity of herbicide absorption
Eg. glycerol.



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

8.1.5. Deposit builders (Stickers or filming agents)

Chemicals added to herbicide concentrates to hold the toxicant in intimate contact with the plant surface. They also reduce washing off of the toxicant from the treated foliage by rain. Eg., Several petroleum oils, Du pont spreader sticker, Citowett.

8.1.6. Compatibility agents Used to intimately mix fertilizers and pesticides in spray liquids Eg. Complex



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities.

8.1.7. Activators (Synergists)

These are the chemicals having cooperative action with herbicides. The resultant phytotoxicity is more than the effect of the two working independently.

Eg., Paraffinic oils, Ammonium thiocyanate, Urea and Ammonium chloride to enhance 2,4 –D phytotoxicity

8.1.8. Drift control agents

Herbicide spray drifts may pose serious hazards to non-target plants. Eg., 2,4-D on cotton. Solution is to spray herbicide liquids in large droplets. Thickening agents eg., (Decagin, Sodium alginate)



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities.*

8.2 Herbicide Formulations (= concentrates)

Herbicides in natural state may be solid or liquid, volatile or non volatile and soluble or insoluble. These cannot be applied in original form; these have to be made in to suitable and safe forms for their field use. Such forms are called herbicide formulations.

A herbicide formulation may be following type

- 1. Emulsifiable concentrate (EC).**
- 2. Water soluble concentrate (SC).**
- 3. Wettable powders (WP).**
- 4. Dry flowables (DF).**
- 5. Flowable liquid (FL).**
- 6. Granules (G).**
- 7. Others – Capsules, wax bars, soluble mulches, foam pieces, aerosols etc.**