

Microelements

These elements are required in **trace amounts** for plant **growth and development**, and have many and diverse roles.

Manganese, Iodine, Copper, Cobalt, Molybdenum, **Iron** and Zinc usually comprise a microelements,

Although Other elements such as Nickel and Aluminum are frequently found in some formulation.

IRON is usually added as iron sulphate, although iron citrate can also be used.

Ethylene diamine tetra acetic acid (((((EDTA))))))

is usually used in conjunction with the iron sulphate. **The EDTA complexes with the iron so as to allow slow and continuous release of iron into the medium.** Uncomplexed iron can precipitate out of the medium as ferric oxide.

Organic supplement

Only two vitamins, **thiamine** (B1) and **myoinositol** (B vitamine) are considered essential for the culture of plant cell in vitro. However , other vitamins are often added to plant cell culture media for historical reasons.

- . The most frequently used Amino Acid is **Glycine** (arginine, asparagine, aspartic acid, alanine, glutamic acid, glutamine and proline are also used, but in many cases its inclusion is not essential. Amino acids provide a source of reduced nitrogen.
- .Casein hydrolysate can be used as a relatively cheap source of a mix of amino acids.

.Carbon source

Sucrose is cheap, easily available, readily assimilated and relatively stable and therefore the most commonly used carbon source. Other carbohydrates (such as glucose, maltose, galactose, & sorbitol) can also be used.

Gelling agent

Media in plant cell culture can be used in either **liquid or solid** forms, depending on the type of culture being grown.

For any culture type that require the plant cell to be grown on the **surface** of the medium, it must be solidified (**gelled**).

Agar produced from seaweed, is the most common type of gelling agent.

However, because it is natural product, the agar quality can vary from supplier to supplier and from batch to batch.

A range of purer gelling agents are available. Purified agar or agarose can be used.

SUMMARY

These components, then, are the basic chemical necessities for plant cell culture media. However, other additions are made in order to manipulate the pattern of growth and development of the plant cell culture.

Plant growth regulators

- They are the critical media components in determining the **developmental pathway** of the plant cells.
- The plant growth regulators used most commonly are **plant hormones** and their synthetic analogs.

Classes of plant growth regulators

- *Auxins*
- *Cytokinins*
- *Gibberellins*
- *Abscisic acid*
- *Ethylene.*

1-AUXINS

Auxins promote both **cell division and cell growth**, the most important naturally occurring auxin is **IAA** (indol-3-acetic acid), but its use in plant cell culture media is limited because it is unstable to both **heat and light**.

sometimes, amino acid conjugates of IAA (such as indole-acetylene-L-alanine and indole-acetylene-L-glycine) which are more stable, are used to partially alleviate the problems associated with the use of IAA.

It is more common to use stable chemical analogue of IAA as a source of auxin in plant cell culture media. 2,4-Dichlorophenoxyacetic acid (2,4-D) is the most commonly used auxin and is extremely effective in most circumstances. Other auxins may be more effective or potent than 2,4-D in some instances.

• *Commonly used AUXINs are:*

- *2,4-D* *2,4-Dichlorophenoxyacetic acid*

- *IAA* *indole-3-acetic acid*
- *IBA* *indole-3-butyric acid*
- *NAA* *1-naphthylacetic acid*

- *MCPA* *2-methyl-4-chlorophenoxyacetic acid*

- *2,4,5-T* *2,4,5-Trichlorophenoxyacetic acid*
- *Dicamba* *2-methoxy-3,6-dichlorobenzoic acid*
- *NOA* *2-naphthyloxyacetic acid*
- *Picloram* *4-amino-2,5,6-trichloropicolinic acid*

•  *The synthetic analogues. **Kinetin** and **BAP**, are therefore used more frequently.*