Sommer’s Medium

All About Sommer’s Medium: A Vital Solution in Tissue Culture

Tissue culture plays a pivotal role in modern biological research and agriculture, where growth conditions are finely controlled in sterile environments. For the in-vitro cultivation of plant tissues or other cells, the composition of the culture medium is crucial. One such tailored solution is **Sommer’s Medium**. In this blog post, we’ll explore what Sommer’s Medium is, its applications, and the formulation required to prepare it for tissue culture.

What is Sommer’s Medium?

Sommer’s Medium is a specialized type of tissue culture medium, primarily designed for specific plant species or tissue types. Its composition provides all the essential elements a tissue needs to grow and differentiate in controlled laboratory conditions. While Sommer’s Medium is not as universally popular as some other media like Murashige and Skoog (MS) Medium, it is still employed in specialized tissue studies and research protocols.

The medium contains a carefully tailored mixture of macro- and micronutrients, vitamins, and organic compounds, all designed to mimic the in-vivo environment’s chemical and nutritional factor for plant tissue growth.

Applications of Sommer’s Medium

Sommer’s Medium finds its use primarily in plant tissue culture applications, including:

1. Organogenesis:

Sommer’s Medium is frequently used to study organ differentiation. Researchers utilize the medium to grow plant tissues where they can induce or observe root, shoot, or leaf formation based on the effect of various hormones and environmental conditions.

2. Protoplast Culture:

Sometimes used in the growth of protoplasts (cells without their cell walls), Sommer’s medium supports the regeneration of cell walls and the eventual development of whole organs or tissues.

3. Micropropagation:

The controlled environment provided by Sommer’s Medium makes it suitable for the propagation of cloned plants via meristem culture, ensuring uniformity and higher growth rates.

4. Conservation:

Some rare and endangered plant species can be preserved and

multiplied using tissue culture methods that involve the use of Sommer’s Medium to maintain essential nutrients and prevent contamination or cell death.

The Formulation of Sommer’s Medium (Per Liter)

The precise chemical formulation of Sommer’s Medium is tailored for specific tissue culture applications, depending on the plant species and experimental conditions. However, the following is a general example of what you might find in a standard Sommer’s Medium formulation:

Macronutrients:

Component	Concentration (mg/L)
NH_4NO_3 (Ammonium nitrate)	800
KNO_3 (Potassium nitrate)	1500
$CaCl_2 \cdot 2H_2O$ (Calcium chloride)	150
$MgSO_4 \cdot 7H_2O$ (Magnesium sulfate)	370
KH_2PO_4 (Potassium dihydrogen phosphate)	170

Micronutrients:

Component	Concentration (mg/L)
H_3BO_3 (Boric acid)	6.2
$MnSO_4 \cdot H_2O$ (Manganese sulfate)	16.9
$ZnSO_4 \cdot 7H_2O$ (Zinc sulfate)	8.6

Component	Concentration (mg/L)
KI (Potassium iodide)	0.83
$Na_2MoO_4 \cdot 2H_2O$ (Sodium molybdate)	0.25
$CuSO_4 \cdot 5H_2O$ (Copper sulfate)	0.025
$CoCl_2 \cdot 6H_2O$ (Cobalt chloride)	0.025

Iron Source:

Component	Concentration (mg/L)
$FeSO_4 \cdot 7H_2O$ (Ferrous sulfate)	27.8
Na_2EDTA (Ethylenediaminetetraacetic acid disodium salt)	37.3

Vitamins and Organic Additives:

Component	Concentration (mg/L)
Myo-Inositol	100.0
Nicotinic acid (Niacin)	1.0
Thiamine·HCl (Vitamin B1)	0.1
Pyridoxine·HCl (Vitamin B6)	0.1
Glycine	2.0

Carbon Source:

Component	Concentration (g/L)
Sucrose	30.0

Preparation Instructions

Step-by-Step Process to Prepare Sommer’s Medium per liter:

1. **Weigh the Ingredients:** Accurately measure the macronutrients, micronutrients, vitamins, and iron source components.
2. **Dissolve Components Separately:** Start by dissolving the salts in distilled water. It’s common to dissolve any ferrous sulfate and EDTA separately in warm water before mixing them into the main solution.
3. **Add Organic Compounds:** Include the vitamins and carbohydrates (such as sucrose) to the medium.
4. **PH Adjustment:** Adjust the pH level of the mixture to around 5.6 to 5.8 using either HCl or NaOH.
5. **Sterilization:** Sterilize the medium in an autoclave at 121°C for about 15–20 minutes.
6. **Pour into Sterile Containers:** Once sterilized, distribute the medium into culture containers in a sterile environment.

You can now use these containers to cultivate your plant tissues in an environment free from contamination.

Why Use Sommer’s Medium?

The specific advantages of using Sommer’s Medium are:

- **Tailored Nutritional Profile:** Sommer’s Medium offers a customized nutritional environment for specific tissues, optimizing their growth rate and differentiation properties.
- **Combination of Micro and Macronutrients:** The formula provides an effective combination of essential salts, vitamins, and nutrients that promote healthy and robust tissue development.
- **Easy Adaptation:** It’s versatile and can be modified easily by adding specific plant growth regulators like auxins, cytokinins, and gibberellins based on the desired end-goal of the experiment or cultivation.

Conclusion

Sommer’s Medium might not be a household name like Murashige & Skoog medium, but its versatility and customization make it an ideal choice for many specialized tissue culture applications. Whether it’s organogenesis, micropropagation, or protoplast regeneration, Sommer’s Medium offers the optimal balance of nutrients required to foster plant tissue development. If you’re planning tissue culture research with specific plant species or if you’re looking to adapt conditions for a particular stage of organism development, following the formulation of Sommer’s Medium might be the solution you’re

seeking!

Feel free to experiment with this tried-and-true medium for your tissue culture needs, but always adapt the medium to your particular plant or tissue type for best results.