Plant Tissue Culture Gelling Agent
CAGGEL™ MTC

CAGGEL™ MTC Gellan Gum for Plant Tissue Culture

Agar is currently the gelling agent of choice for plant tissue culture. However, the presence of impurities or inhibitory factors (including sulfur) in agar can adversely affect growth. CAGGEL™ MTC offers a promising alternative to agar in this application because of its purity. The similarity between agar and gellan gum has led to the gellan as an alternative to agar for plant tissue culture media. gellan gum can not only replace agar in many routine medium applications, but can also give a higher degree of root growth in certain situations.

CAGGEL™ MTC is a kind of special designed low acyl gellan gum which can be used to formulate a suitable growth matrix for many plant tissue culture mediums. .

Ease of Processing with CAGGEL™ MTC Medium

- CAGGEL™MTC gellan gum disperses and hydrates easily in either hot or cold deionized water, forming viscous solutions in cold distilled water.
- In the presence of soluble salts, CAGGEL™ MTC can be used to provide high gel strength at low CAGGEL™MTC concentrations (normally at approximately half the concentration required for agar).
- At high temperatures, the low viscosity of CAGGEL™MTC solutions facilitates pipetting, pumping, and pouring upon cooling, CAGGEL™MTC solutions gel quickly and uniformly.
- CAGGEL™MTC is able to withstand normal autoclaving conditions.
- CAGGEL™MTC is generally resistant to enzymatic degradation.
  CAGGEL™MTC itself is chemically inert to most plant growth media additives

Quality of Plant Tissue Culture Medium Prepared with CAGGEL™ MTC

- CAGGEL™MTC gellan gum gels have proven to be a suitable growth matrix for a wide variety of plants, including those traditionally cultured on agar plates as well as other species not easily grown on other substances.
- CAGGEL™MTC gels are exceptionally clear, making them an excellent analytical tool.
- CAGGEL™MTC gels have essentially the same shelf life as agar gels.

Table 1. Recommend dosage for part of plant tissue culture mediums

(Applications)	(Dosage)
MS Medium ,1962	0.20%～0.5%
B5 Medium	0.35%～0.5%
N6 Medium	0.25%～0.5%
Nitch Medium	0.25%～0.5%
White Medium	0.2%～0.3%
S-Medium	0.2%～0.3%
DKW (Driver and Kuniyuki Walnut)	0.3%～0.5%

Advantages of CAGGEL™ MTC Compared to Agar

- CAGGEL™MTC gellan gum may be used at approximately half the use level of agar
- CAGGEL™MTC, produced by a tightly-controlled fermentation process, has consistent product

quality. CAGGEL™MTC is unaffected by the vagaries of natural conditions which affect the basic properties of agar.

- CAGGEL™MTC gels are remarkably clear in comparison to those formed with agar.
- Gels prepared with CAGGEL™MTC set faster than those made with agar. In plant tissue culture applications this reduces preparation time.
- Gels prepared with CAGGEL™MTC are stable at high temperatures. In medium sterilization process, the gel remains high gel strength.
- CAGGEL™MTC contains no contaminating matters (e.g., phenolic compounds) as those found in agar that are toxic to certain sensitive organisms.

The comparison of CAGGEL™ MTC and agar agar

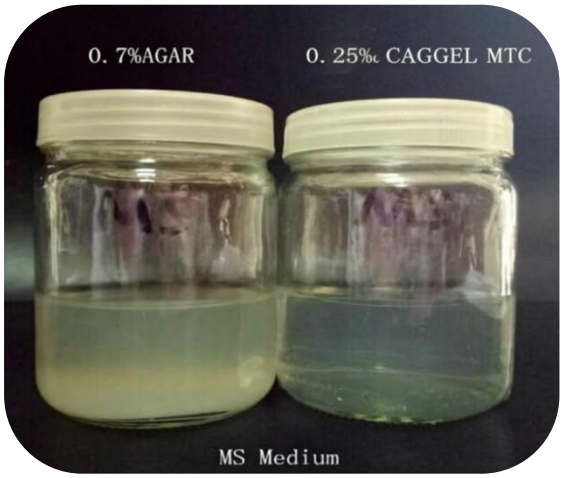


Figure 1. MS Medium

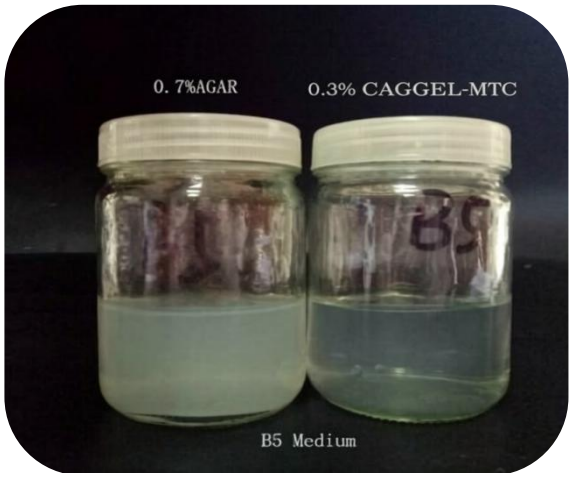


Figure 2. B5 Medium

Figure 3. N6 Medium

Figure 4. White Medium

Comparison of CAGGEL™ MTC and common grade gellan gum

The CAGGEL™ MTC is a very special designed gellan gum, it is different to the common food grade gellan gum, so if we use common food grade gellan gum in most of plant tissue mediums, we will meet problems. The following test shows this problem.

Tests were conducted using Murashige & Skoog Modified Basal Medium with Gamborg Vitamins (MS) as the solvent for the MTC and food grade Gellan Gum. Treatments were applied as indicated in Table 2. Each test was replicated a minimum of three times for each sample.

Table 2. Tests and results of preparation method, gelling ability, and gel clarity using Common food grade Gellan Gum.

Test	Result[2]
Prepared in MS, Dispensed without Prior Heating, Autoclaved[1]	Dispensed as Cloudy Suspension Gelled, Haze Throughout Gel, More Haze at Bottom of Gel w/ Clearing Toward Top (Figure 6)
Prepared in MS, Boiled (100°C), Hot Dispensed, Autoclaved	Dispensed as Cloudy Suspension, Gelled, Slight Haze Throughout Gel(Figure 7)

1.Autoclave conditions = 15 psi at 121°C for 20 minutes

2.Anticipated result = dispense clear w/ no suspended solids, solidified gel, highly clear gel

Figure 5. Typical gel clarity observed in MS plant tissue culture medium solidified using CAGGEL™MTC

Figure 6. Concentrated haze observed in MS solidified using common food grade gellan Gum. Note darker haze toward bottom of gel with clearing toward top of gel. Gel solidified throughout.

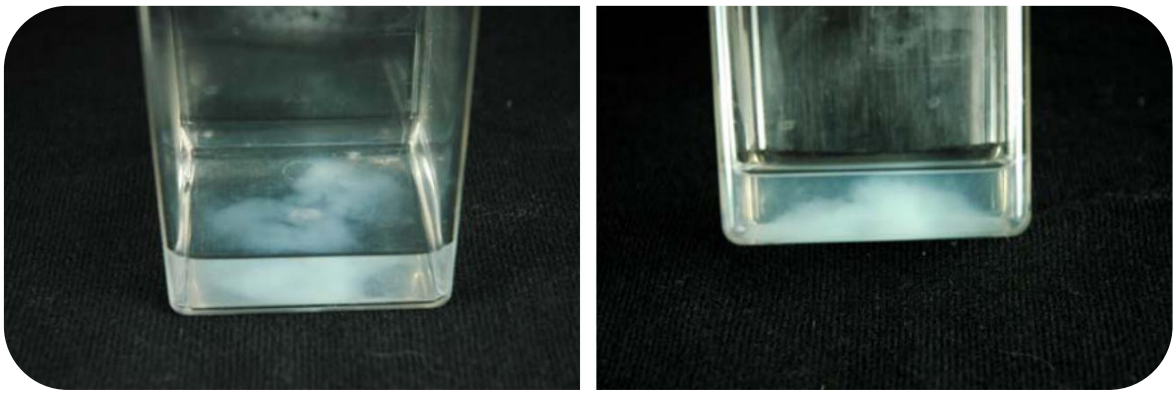


Figure 7. Slight haze observed throughout MS solidified using common food grade gellan Gum. Note slight haze throughout gel. Gel solidified throughout.

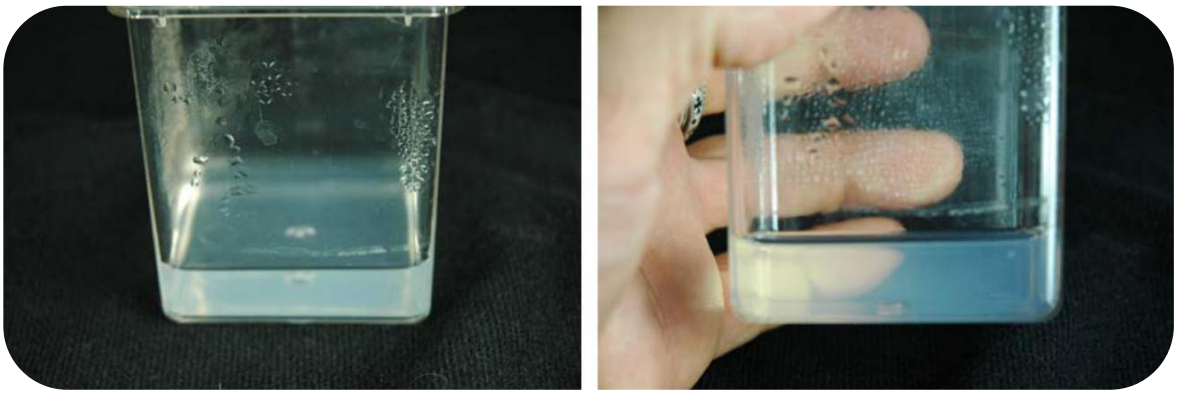


Table 3. The comparison of gel strength and transmittance between Agar and MTC

Plant Tissue Culture	Agar (%)	MTC (%)	Wave Length (nm)	Transmittance (%)	Gel Strength (g/cm^2)
MS	0.7	--	530	51	146
	--	0.25	530	87	144
White	0.7	--	530	44	50.3
	--	0.25	530	92	150
B5	0.7	--	530	38	211
	--	0.25	530	90	88
N6	0.7	--	530	43	225
	--	0.25	530	91	113
DKW (Driver and Kuniyuki Walnut)	0.5	--	530	41	307
	--	0.5	530	84	649

Fig. 8 Cultivation in different conditions of MS medium. a Gelled by the 0.6 % agar; b gelled by the 0.3 % MTC; c liquid; d liquid with filter paper bridge

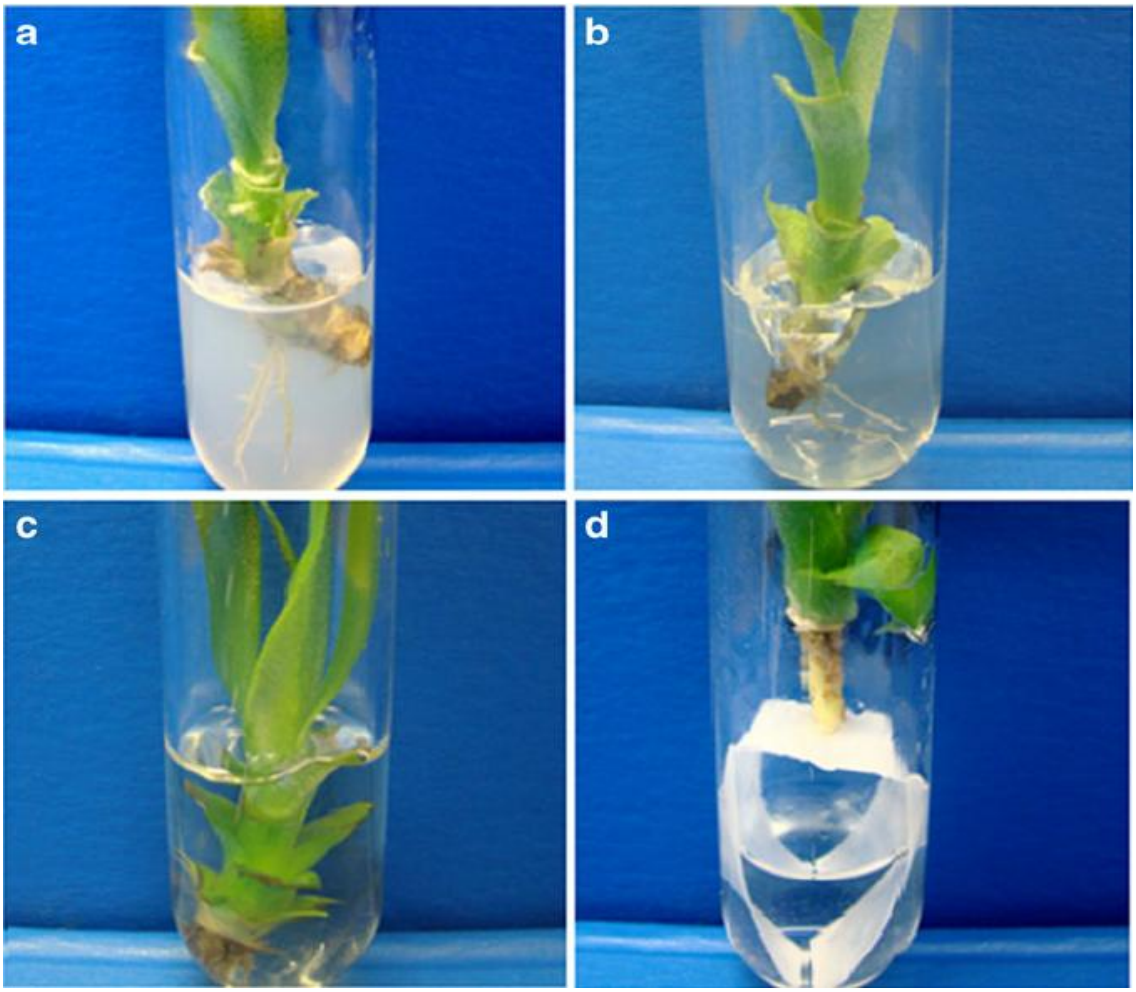
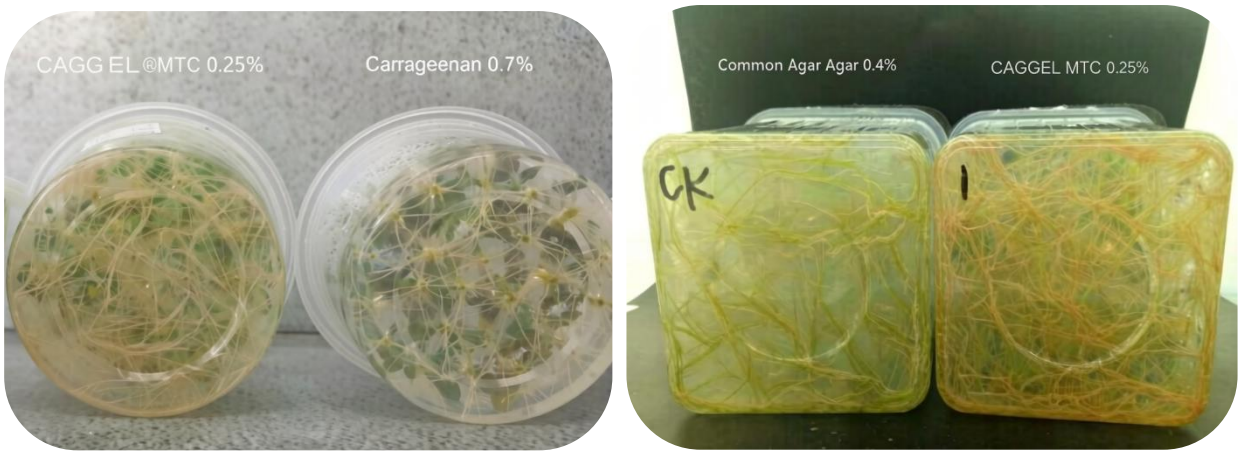


Fig. 9 Potato Plantlets Cultivated in 0.7 % Carrageenan and 0.25% CAGGEL^{TM}MTC.



For the root development, the CAGGEL^{TM}MTC is better than common agar and carrageenan

Table 4. CAGGEL^{TM} MTC Ingredients List

Elements/ ingredients	Content	Elements/ ingredients	Content
Na^+ （Sodium）	2000mg/kg	Cl^- (Chloride)	48000mg/kg
K^+ （Potassium）	13700mg/kg	SO_4^{2-}	100mg/kg
Ca^{2+} （Calcium）	3000mg/kg	NO_3^-	<50mg/kg
Mg^{2+}（Magnesium）	66mg/kg	NH_4^+	<50mg/kg
Mn^{2+} （Manganese）	1mg/kg	Inositol	—
Zn^{2+} （Zinc）	4mg/kg	Niacin	—
$Fe^{2+/3+}$ （Iron）	3mg/kg	Boric acid	—
Cu^{2+} （Copper）	2mg/kg	Molybdic acid	—
Co^{2+} （Cobalt）	<0.005mg/kg	Ethylenediamine	—
Hg （Mercury）	<0.005mg/kg	Kinetin	—
Pb （Lead）	0.15mg/kg	Glycine	—
As （Arsenic）	<0.1mg/kg	Vitamin B6	—
Cd （Cadmium	<0.01mg/kg	Vitamin B1	—
I (Iodine)	<0.01mg/kg	Antibiotics	—
Plant Protein	< 600mg/kg	Plant growth regulators	—

Note：- means not contain

Packing：

100g/Bottle，500g/Bottle，1000g/Bottle，2000g/bottle or bulk package