



VERSION 2

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## 605CefTB - Resting Medium (basta selection) V.2

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Transformation of B104 maize embryos using GRF-GIF/BBM somatic embryogenesis



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We use this protocol and it's working

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This is part of the Leiboff Lab maize transformation protocol for somatic embryogenesis of B104 immature embryos. This protocol is a combination of Chen et al. 2022 and Kang et al. 2022 with some modifications based on material availability. This protocol is intended for the GRF-GIF/BBM somatic embryogenesis transformation strategy with the LBA4404 Met<sup>-</sup> auxotrophic *Agrobacterium* strain.

Embryos will be transferred (scutellum side up) from Resting Medium 605CefT to Resting Medium 605CefTB, 10 days after infection (DAI). 605CefTB should be used for 7 days, before moving embryos to Shoot Maturation Medium 13329A. Resting Medium contains added synthetic auxin (2,4-D) to encourage callus and shoot growth. 605CefTB is high in sucrose and uses a small amount of glucose to encourage rapid plant growth. 605CefTB contains 5 mg/L of bialaphos (preferred for basta selection in maize over glufosinate) as a plant selective agent, and uses both Cefotaxime and Timentin to control *Agrobacterium* contamination. The antibiotic concentrations used here are sufficient to control the LBA4404 Met<sup>-</sup> auxotrophic strain, but were not sufficient to control wild-type LBA4404 in 3 prior trials.

605CefTB solid media should be prepared in 15x100 (standard) petri plates, planning for ~20 embryos per plate. Material grown on 605CefTB will be sealed with micropore tape and be incubated at 28C in the dark. Embryos are ready to move off 605CefTB after 1 week. There should be noticeable growth on the scutellum side of the embryo at this time and somatic embryos may be established, but do not be alarmed if this is not obvious.

## Planning

- 1 Estimate the volume of 605CefTB you will need based on the following:

$$Volume = 30mL * NumberPlates$$

Make sure to round up! Check the table below to plan your media

## Mixing Heat-Stable Ingredients

- 2 Retrieve the following heat-stable ingredients:
  1. 605 Medium - Stored in Main Lab, 4C Refrigerator, Top Shelf
  2. Casin Hydrolysate - Stored in Main Lab, Chemical shelf 'C', use Megraw stock
  3. 2,4-D (5 mg/mL) - Stored in Main Lab, -20C Freezer, Bottom drawer 'Tissue Culture 1'
  4. Sucrose - Stored in Main Lab, Chemical shelf 'S', use Fowler refillable container
  5. D-Glucose - Stored in Main Lab, Chemical shelf 'G'
  6. Agar, Phyto - Stored in Main Lab, Chemical shelf 'A'

- 3 Retrieve a graduated cylinder for measuring your final solution  
Place a stir bar at the bottom on a beaker that is ~1.5x the volume of your solution  
Rinse stir bar+beaker and graduated cylinder with MQ H<sub>2</sub>O, discard rinse water in sink  
NOTE: Any soap or detergent residue will interfere with the tissue culture process; if you see suds, rinse again or find different glassware
- 4 Add approximately 90% of your final media volume in MQ H<sub>2</sub>O to your beaker  
Place beaker on a magnetic stir plate  
Turn stir plate on to generate a vigorous stir
- 5 Using a fresh weigh paper and dry spatula/scoopula/pipette tip for each ingredient, add the following to your beaker:

A	B	C	D	E
Ingredient	100 mL	200 mL	300 mL	600 mL
605 Medium	1.1 g	2.2 g	3.3 g	6.6 g
Casin Hydrolysate	0.03 g	0.06 g	0.09 g	0.18 g
2,4-D	11.5 uL	23 uL	34.5 uL	69 uL
Sucrose	2.0 g	4.0 g	6.0 g	8.0 g
D-Glucose	0.06 g	0.12 g	0.18 g	0.36 g

- 6 Thoroughly rinse all used tools with running water  
Place clean tools in drying rack  
Return chemical reagents to their original storage location

### Adjust solution pH to 5.7 with 0.1 M KOH

- 7 Turn on the Hanna Instruments pH meter  
Unscrew and remove the small green pH probe exchange cover and set cap aside  
Gently remove the probe from the storage tube and set storage tube aside  
Using squeeze bottle, rinse the glass probe with H<sub>2</sub>O, catch rinse water in a waste beaker  
Gently blot probe with laboratory tissue paper to dry
- 8 Using adjustable arm, lower the pH probe into the beaker with stir plate on  
Ensure that the stir bar does not strike the probe  
Electrode at the base of the probe must be fully submerged
- 9 Using a plastic transfer pipette, add 0.1M KOH to your solution until you measure pH 5.7

NOTE: KOH can be added rapidly until pH 5.4, then add one drop at a time to reach pH 5.7  
Solution pH between 5.6 - 5.8 is acceptable

- 10 Using the adjustable arm, remove the pH probe from the beaker  
Using squeeze bottle, rinse the glass probe with H<sub>2</sub>O, catch rinse water in a waste beaker  
Gently blot probe with laboratory tissue paper to dry  
Return the probe to the storage tube -- Ensure the electrode bulb is fully submerged in storage solution  
Return and secure the small probe exchange cover  
Turn off the pH meter

## Bring solution to target volume, add phytoagar, and autoclave

- 11 Turn off the stir plate and remove your beaker  
Hold a large stir bar in your hand to stabilize the one in your beaker  
Pour your solution into the graduated cylinder -- Do not include the stir bar  
Add a small amount (50-100 mL) of water to your beaker  
Carefully add water from the beaker to the graduated cylinder until your solution reaches the target volume --  
Do not include the stir bar

- 12 Retrieve a clean dry bottle and matching cap  
Using a fresh weigh paper and dry spatula/scoopula:

A	B	C	D	E
Ingredient	100 mL	200 mL	300 mL	600 mL
Phytoagar	0.6 g	1.2 g	1.8 g	3.6 g

Add phytoagar to dry bottle

NOTE: Adding phytoagar to dry bottle avoids clumping which is undesirable for final media

- 13 Loosely place the cap over the bottle  
Add a small piece of autoclave tape on the cap and bottle  
Place the bottle in an autoclave-safe bin  
Autoclave 20-25 min using the 'Liquid' setting  
NOTE: Recommended autoclaves are in Cord 3112 and 4112. Complete cycle will take ~1 hr.
- 14 Rinse all used tools and glassware in running water  
Place clean items on drying rack  
Return chemical reagents to their original storage location

## Adding Heat-sensitive Ingredients

- 15 Return to the autoclave to pick up your solution -- Be prompt, sucrose can degrade if left too long  
Using autoclave gauntlets, gently seal the cap of the bottle

Swirl the autoclaved solution to evenly mix phytoagar

- 16** Carefully return to the lab with autoclave bin and sealed bottle  
Place your sealed solution into the large 55C water bath in the main lab  
Discard any liquid remaining in the autoclave bin and return to bin storage  
NOTE: Your solution needs to reach ~55C before adding the heat-sensitive ingredients

- 17** Retrieve the following heat-sensitive ingredients:
1. Dicamba (1 mg/mL) - Stored in Main Lab, -20C Freezer, Bottom drawer 'Tissue Culture 2'
  2. Silver nitrate (1 mg/mL) - Stored in Main Lab, -20C Freezer, Bottom drawer 'Tissue Culture 2'
  3. Cefotaxime (100 mg/mL), 'Cef' - Stored in Main Lab, -20C Freezer, 'Antibiotics 2'
  4. Timentin (300 mg/mL), 'Tim' - Stored in Main Lab, -20C Freezer, 'Antibiotics 2'
  5. Bialaphos (1 mg/mL) - Stored in Main Lab, -20C Freezer, 'Tissue Culture 3'
- Place reagents in a tube rack and move to laminar flow hood to thaw

- 18** Turn on the laminar flow hood, airflow and lamp  
Using 70% EtOH spray bottle and paper towels, sterilize the working area inside the laminar flow hood  
Retrieve sterile petri plates  
Using a fine-tipped sharpie, write '605CefT' and the date along the bottom rim of the plate

- 19** When your solution reads 55C with a digital thermometer gun,  
transfer your sealed bottle to the laminar flow hood.  
The bottle should be warm, but safe to handle.  
Sterilize the outside of the bottle and your gloved hands with 70% ethanol spray.

- 20** Using a fresh filter tip for each ingredient, add the following to your bottle:

A	B	C	D	E
Ingredient	100 mL	200 mL	300 mL	600 mL
Dicamba	120 uL	240 uL	360 uL	720 uL
Silver nitrate	340 uL	680 uL	1020 uL	2040 uL
Cef	100 uL	200 uL	300 uL	600 uL
Tim	33 uL	67 uL	100 uL	200 uL
Bialaphos	500 uL	1000 uL	1500 uL	3000 uL

Used tips may be disposed of in regular lab waste -- no contact with rDNA or modified cells is anticipated.

- 21** Gently swirl media bottle to mix thoroughly, but avoid introducing bubbles.  
Pour media into plates, ~30 mL per plate.  
NOTE: Each plate should be more than half-full with media.  
Close plates to solidify in laminar flow hood.

- 22** Using paper towels, clean any spilled media and discard in regular lab waste.  
When plates are poured, rinse media bottle in lab sink and hang on bottle rack to dry.  
Return reagents to their original storage location.  
Using 70% EtOH spray bottle and paper towels, sterilize the working area inside the laminar flow hood for the next worker.
- 23** Leave closed plates to solidify in the laminar flow hood with the fan on, 3 hrs - overnight.  
NOTE: Keep plates ~10 cm (4 in) away from the back of the flow hood to avoid drying out.  
When plates are solid, wrap in a clean plate bag or individually seal with parafilm and store upside-down at 4C, up to 1 week.