

## Supplementary Tables and Figures

**Table S1.** Formulations of *Streptomyces* strains

Strain	Encapsulated biomass	Formulation	Supplements	CFU mL <sup>-1</sup> (or g <sup>-1</sup> ) before/after encapsulation	shelf-life	Storage at	Ref.
<i>Streptomyces</i> sp. T-741	spores	Lyophilization and freezing in liquid nitrogen	sucrose (10 %), skimmed milk (5.5 %) and gelatin (1.5 %)	80-90%	8 years	4°C	[21]
<i>Streptomyces rochei</i>	spores	wettable talcum powder, sodium alginate pellets and sodium alginate-clay pellets *. Calcium alginate capsules were dried	1.5 g of calcium carbonate and 10 g of carboxymethyl cellulose	2.1×10 <sup>5</sup> CFU g <sup>-1</sup> to 1.9×10 <sup>5</sup> CFU g <sup>-1</sup> /2×10 <sup>6</sup> CFU g <sup>-1</sup> to 1.7×10 <sup>6</sup> CFU g <sup>-1</sup> ; 2×10 <sup>6</sup> CFU mL <sup>-1</sup> to 3.7×10 <sup>5</sup> CFU g <sup>-1</sup> (after drying 92%; 91%; 89%)			[27]
<i>Streptomyces cameroonensis</i>	sporal solution	Talcum powder and cassava starch (a 0.8 mm sieve)	15 g calcium carbonate and 10 g methyl cellulose	10 <sup>9</sup> CFU/ml (400 mL); 1.07×10 <sup>6</sup> CFU g <sup>-1</sup>	6 months	4°C	[16]
<i>Streptomyces</i> sp. Di-944	lyophilized fragments of viable vegetative filaments	Alginate beads, durum flour (starch) granules, and talcum powder formulation		(6.9×10 <sup>4</sup> and 7.3×10 <sup>2</sup> viable propagules/g) 2×10 <sup>7</sup> CFU g <sup>-1</sup> ; 1.2×10 <sup>5</sup> CFU g <sup>-1</sup> ; 7×10 <sup>3</sup> CFU g <sup>-1</sup>	(12-24 weeks) 14-10 weeks (good)	4°C	[44]
<i>Streptomyces griseus</i>	vegetative cells	sodium alginate/ kaolin clay/ alginate-kaolin combination		10 <sup>6</sup> CFU g <sup>-1</sup> soil/ 10 <sup>6.12</sup> / 10 <sup>6.16</sup> CFU g <sup>-1</sup>			[13]
<i>Actinobacterias</i>	vegetative cells	cryopreservation and dry-freezing; clay, silica and sand	cryoprotectants, glycerol at 20% and 30% (v/v) to freeze and 18% skim milk (w/v) for dry-freezing	10 <sup>8</sup> cells mL <sup>-1</sup> (glycerol at 30% was the best)	1 year	4°C	[18]
<i>Streptomyces fradiae</i> NKZ-259	Vegetative cells	wettable starch-kaolin powder		(5.4×10 <sup>6</sup> CFU/mL) 73.74 %	4 months	4°C	[15]

\*Texts were marked in color to relate data by line.

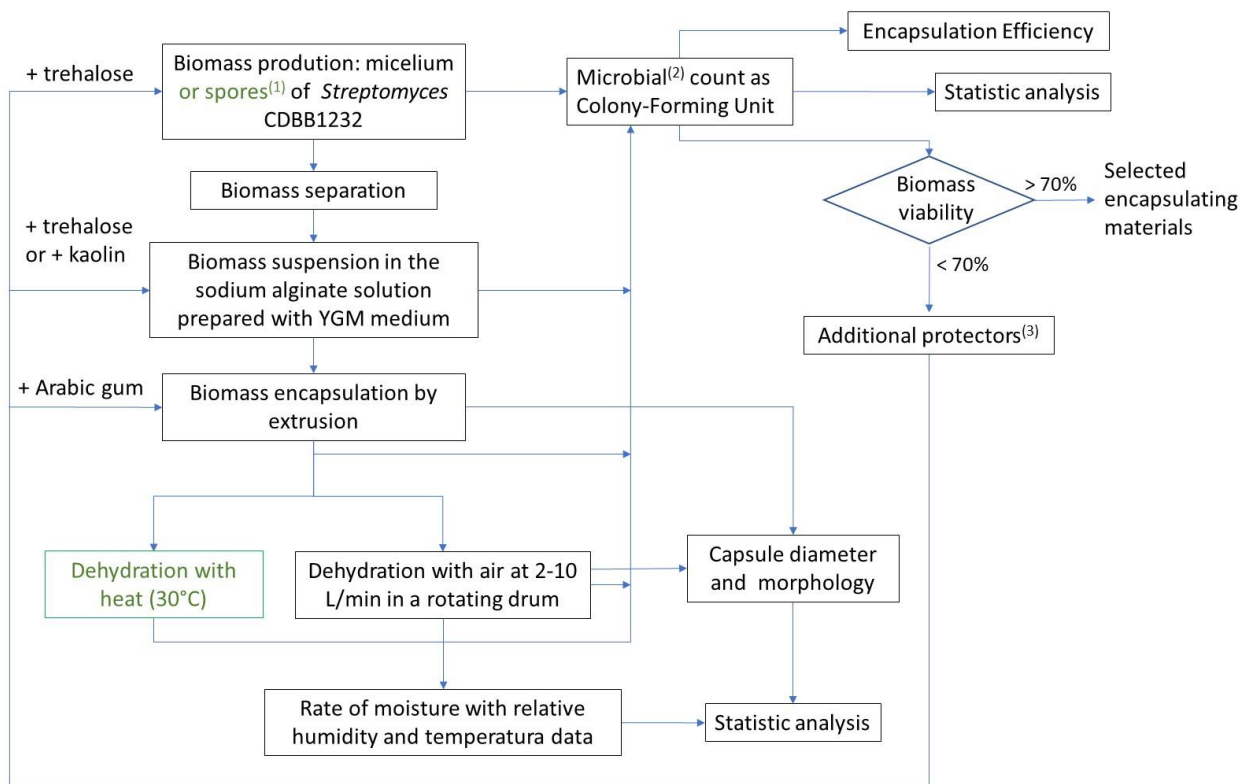
**Table S2.** Encapsulated and dehydrated formulations of bacteria with application in soil fertilization.

Drying method	Formulation	Drying time (h)	Microorganisms used	Wet beads diameter	CFU g <sup>-1</sup> Initial(wet)/final (dry)	Ref.
Dry air at 38°C	Alginate beads	48 h/(10g beads)	<i>Azospirillum brasilense</i> Cd (ATCC 29710)	100 - 200 µm	2x10 <sup>11</sup> /3x10 <sup>9</sup>	[22]
Laminar flow hood at 25°C	Alginate beads	20 h)/50g beads	Cells of <i>Pseudomonas fluorescens</i>	1mm	4.5x10 <sup>11</sup> /4.7x10 <sup>8</sup>	[23]
Dried in an oven at 35°C	Alginate and starch	24 h	<i>Azospirillum brasilense</i> Sp245	2.3 mm	2.8x10 <sup>10</sup> /6.5x10 <sup>6</sup>	[24]
Drying chamber (desiccator) 23°C	Alginate and protective ingredients	72 h,	<i>Lactobacillus rhamnosus</i> R0011	2.5 mm	1x10 <sup>8</sup> /2.5% or 56% with maltodextrin and y glycerol	[25]
Spray-dried inlet air temperature 130°C; outlet temperature 49°C.	Algnate powder		Methylobacterium radiotolerans	powder	1x10 <sup>11</sup> /1x10 <sup>10</sup>	[26]
Laminar flow hood	Sodium alginate pellets	Overnight	Spores of the strain PTL2 ( <i>S. rochei</i> NBRC 12908T)	3mm	2x10 <sup>6</sup> /4.5x10 <sup>5</sup>	[27]
Dried at room temperature	Microcapsuled	to obtain constant weight	<i>Klebsiella oxytoca</i> Rs-5	1.10 mm	10 <sup>14</sup> /10 <sup>10</sup>	[28]
Oven maintained at 40°C	Alginate-starch-bentonite	48 h	<i>Raoultella planticola</i> Rs-2	2.2- 3.6mm	9.11x10 <sup>12</sup> /5.9x10 <sup>6</sup>	[29]
Circulating air oven at 40°C	Starch–alginate beads (10:1.5 %w/v)	12 hours	<i>Aspergillus flavus</i> spores	1.95mm	7.5 log/4.5 log	[30]

\* References included at the end of this document.

**Table S3.** Characteristics of drying methods most frequently applied during formulation development of bacteria inoculants [14].

	Freeze drying	Spray drying	Fluidized bed-drying	Vacuum-drying	Air-drying
Minimum sample size	µL - mL	< 100 mL	< 100 mL	µL - mL	µL - mL
Typical temperature range	< 0°C	inlet 100-200°C; outlet 60-85°C	30-35°C	40-70°C	25-35°C
Matrix compatibility	No limitations	Liquid matrix	Liquid matrix sprayed onto carriers; pre-dried granular matrix	No limitations	No limitations
Out form	Cake – further processing required	Small sized particles	Medium sized, particles, granules	Cake – further processing required	Cake – further processing required
Typical drying time	Hours-days	Seconds-minutes	Minutes-hours	Hours-days	Hours-days
Operation	Straight forward	Challenging	Challenging	Straight forward	Challenging



(1) Control experiments are identified in green.

(2) The spore count was determined in a Neubauer chamber.

(3) Biological material released from the alginate matrix and suspended in sterilized distilled water or 1% sodium citrate solution.

(4) Studies carried out with data reported in the literature

**Figure S1.** Experimental methodology