

# BioStart

## Application Sheet

### ACTIVE INGREDIENT

Penicillium Bilaiae.....	2.33%
Other Ingredients .....	97.67%
Total.....	100%

\*Contains at least  $1.5 \times 10^9$  colony forming units per gram dry weight

**Improved Phosphate Availability,**

**NON PLANT FOOD INGREDIEN, Not a fertilizer substitute**

**KEEP AWAY FROM CHILDREN  
CAUTION**

### HOW IT WORKS

The active ingredient in BIOSTART Wettable Powder Inoculant is the soil fungus *Penicillium bilaiae*, which grows on plant roots and makes less-available residual soil phosphate available for crop use.

### DIRECTIONS FOR USE

**On-seed treatment (all crops except peanut):**

Inoculate seed on-farm by adding BIOSTART to the appropriate amount of non-chlorinated water (refer to Table 1) prior to or during seeding.

BIOSTART Wettable Powder Inoculant can be applied utilizing commercial on seed application equipment. Applicators used previously for pesticides should be triple rinsed before using for BIOSTART Wettable Powder Inoculant application.

To divide the contents of a bottle of BIOSTART Wettable Powder Inoculant, first suspend entire contents in 500 ml (0.5 US quarts) non-chlorinated water, mix thoroughly and divide the mixture into smaller quantities as desired. BIOSTART Wettable Powder Inoculant in solution must be applied to the seed within 24 hours.

BIOSTART Wettable Powder Inoculant can be used with all nitrogen-fixing rhizobial inoculants. To mix BIOSTART Wettable Powder Inoculant with a liquid inoculant, first suspend the entire contents of the BIOSTART Wettable Powder Inoculant bottle in a small amount of the liquid inoculant for easier mixing. Pour the mixture into the remaining liquid Rhizobia inoculant and mix to suspend. No additional water is required.

## **Continuous flow application**

### **Wheat, pea, lentil, chickpea, or dry bean**

- Apply the BIOSTART Wettable Powder Inoculant suspension to seed using a flow-regulated applicator when transferring seed from the bin to the truck, or from the truck to the tank or seed cart.
- Fill the applicator tank with the required volume of cool, clean, non-chlorinated water (refer to Table 1).
- While mixing continuously, slowly add the contents of the BIOSTART Wettable Powder Inoculant container to the water in the applicator tank.
- Mix well and agitate continuously to avoid settling.
- Determine the conveyor or auger flow rate in bu/min, and set the applicator to achieve the required flow rate (refer to Table 2). For best mixing, run the auger or conveyor at full speed and less than full capacity.

## **Batch application**

### **Corn, soybean, sunflower, sugar beet, sorghum, canola, mustard, alfalfa, or sweet clover**

- Apply the BIOSTART Wettable Powder Inoculant suspension to seed using a batch treater or cement mixer.
- Fill the applicator tank with the required volume of cool, clean non-chlorinated water (refer to Table 1).
- Add the BIOSTART Wettable Powder Inoculant container to the water in the applicator tank.
- Mix well and agitate continuously to avoid settling.
- Put seed in the batch treater or cement mixer. Do not overload treater with seed. There must be enough space for mixing.
- Slowly apply the proper volume of BIOSTART Wettable Powder Inoculant suspension to the seed as it tumbles (approximately 2 minutes).
- Re-bag the inoculated seed.
- Repeat with the remaining bags of seed. Note: re-shake or continue agitating the BIOSTART Wettable Powder Inoculant suspension in the applicator until fully suspended before inoculating the remaining bags of seed.

**Table 1: On-seed application rates and bare seed planting windows**

Crop	Inoculate Rate by 100 gram	Approx. Water Volume	Planting Window(bare seed)
Wheat	1,100 kg	14 liters	30 days
Pea	1,900 kg	12 liters	30 days
Chickpea	1,500 kg	8 liters	30 days
Dry Bean <sup>1</sup>	1,100 kg	7 liters	30 days
Lentil	1,100 kg	7 liters	30 days
Soybean	1,135 kg	7 liters	30 days
Sunflower <sup>2</sup>	100 kg	4 liters	30 days
Sorghum <sup>3</sup>	136 kg	3.6 liters	60 days
Alfalfa	68 kg	3 liters	7 days
Sweet Clover	63 kg	3 liters	7 days
Canola/ Mustard	63 kg	3 liters	60 days
Sugar Beet	5 unit	2 liters	7 days
Corn	10 bags <sup>4</sup>	6 liters	60 days

1. Use with pinto, great northern, black, navy, kidney, red, and pink bean.
2. When treating confectionary sunflowers, increase water rates to ensure proper coverage.
3. The application rate is currently under review. The rate provided is based on our experience with other crops.
4. 80,000 kernels per bag.

## NOTES

- Once BIOSTART Wettable Powder Inoculant is mixed in water, apply to seed within 24 hours.
- The planting window is the maximum time allowed between BIOSTART Wettable Powder Inoculant application and seeding.
- Application with other seed treatments is possible but may reduce the planting window.

**Table 2. Applicator flow rate calibration (based on one 100 g)**

Auger Flow Rate				Application Rate									
				Wheat		Pea		Dry Bean		Chickpea		Soybean	
bu/hr	bu/min	kg/hr	lb/min	Min /rate <sup>1</sup>	L/min	Min /rate	L/min	Min /rate	L/min	Min /rate	L/min	Min /rate	L/min
240	4	6,532	109	10	0.71	17.5	0.32	10	0.36	13.8	0.31	10.3	0.35
360	6	9,798	163	6.7	1.07	11.7	0.48	6.7	0.53	9.2	0.46	6.8	0.52
480	8	13,063	218	5	1.42	8.8	0.65	5	0.71	6.9	0.62	5.1	0.69
600	10	16,329	272	4	1.78	7	0.81	4	0.89	5.5	0.78	4.1	0.87
720	12	19,595	327	3.3	2.13	5.8	0.97	3.3	1.07	4.6	0.93	3.4	1.04
840	14	22,861	381	2.9	2.49	5	1.14	2.9	1.24	3.9	1.09	2.9	1.21
960	16	26,127	435	2.5	2.84	4.4	1.30	2.5	1.42	3.4	1.24	2.6	1.38
1080	18	29,393	490	2.2	3.20	3.9	1.46	2.2	1.60	3.1	1.39	2.3	1.56
1200	20	32,659	544	2	3.55	3.5	1.62	2	1.78	2.8	1.55	2.1	1.73

1. Minutes to apply one 100 g BIOSATRT. (See instructions for How to Apply).

### In-furrow application peanut:

- Add the BIOSTART to the appropriate amount of water and apply at planting.
- Once BIOSTART is mixed in water, apply to seed in-furrow.

1. **Clean the liquid system with a cleaning solution.** BIOSTART is a biological product, which may be sensitive to chemical residues.
2. **Convert the sprayer to in-furrow application.** Remove spray tips and replace with appropriate flow regulator “orifice discs”. Proper orifice disc number may be determined from spraying manual. The objective is to obtain a solid stream of liquid into the furrow. Place spraying assembly behind the seed planting assembly so that the solid stream of product will flow into the furrow and on the seed. BIOSTART should be on the seed and in the furrow before it closes, not to the side nor above or below the seed.

**3. Fill clean spray tank half full with clean, non-chlorinated water.**

Pull the BIOSTART package from the carton, remove the cap and empty into the inoculant bag and shake well. Add remainder of clean, non-chlorinated water to spray tank to the appropriate solution level. Use the diluted product within 24 hours. Do not allow the diluted tank mix to exceed 100° F.

**4. Application rate/unit coverage.** BIOSTART is applied in-furrow at rates on table 3 below. The quantity of BIOSTART applied per acre varies depending upon the row width. The measurement chart provides the recommended rate of BIOSTART per acre and indicates the number of acres treated with each row width. The application of the diluted liquid should be approximately 3 to 20 gallons/acre based on equipment used and soil moisture. Calibrate sprayer to deliver correct amount.

**Table 3: In-furrow application rates for peanut**

Row width	Application	Inoculate Rate by 100 gram
	7.62 cm (30")	
Single row	23.2 g/ha	3.4 ha (83 acres)
Twin row	46.6 g/ha	1.7 ha (4.2 acres)
	91.4 cm (36")	
Single row	28.0 g/ha	4.04 ha (10 acres)
Twin row	56.0 g/ha	2.02 ha (5 acres)

## WHERE TO USE FOR MAXIMUM BENEFIT

**For soils low to medium in available phosphate:**

Use BIOSTART with the lower recommended P fertilizer rate from soil test results. If you do not soil test, use with your normal P fertilizer rate.

**For soils high to very high in available phosphate:**

Replace the starter in-row P fertilizer application [16.8-22.4 kg P2O5/ha (15-20 lb P2O5/acre)] with BIOSTART.

**Benefits of using BIOSTART may be limited on:**

- Extremely sandy soils (greater than 85% sand).

- Extremely high organic matter soils (greater than 14% organic matter).
- Fields that have been heavily manured over the last several years.

## APPLICATION AND OTHER HANDLERS

The active ingredient in BIOSTART phosphate-solubilizing inoculant is *Penicillium bilaiae* spores. Eye or skin contact, inhalation, or ingestion should be avoided. Wear standard protective clothing and equipment including gloves and safety glasses. Ensure adequate ventilation. Where exposure through inhalation may occur, use respiratory protective equipment. This product contains microorganisms that may have the potential to provoke sensitizing reactions; use appropriate personal protective equipment (PPE) to reduce exposure. Sensitized individuals should wear a NIOSH-approved respirator. In case of contact with skin or eyes, immediately flush exposed areas with plenty of water. Get medical attention if irritation occurs.

## STORAGE AND DISPOSAL

The active ingredient in BIOSTART is a living organism and requires specific storage conditions to ensure viability and product performance. To maintain product viability:

- Store BIOSTART and seed to which BIOSTART has been applied in a cool, unheated facility <20°C (68°F) away from sunlight and direct heat sources.
- Minimize temperature fluctuations.
- Avoid freeze/thaw cycles.
- Use entire contents of container once opened.
- Use before the expiry date. The expiry date is valid only for unopened containers stored under the conditions listed above.
- Do not mix with unapproved products.
- For a list of compatible seed treatments, contact TANGSONS BIOTECH. Unused BIOSTART and unplanted seed to which BIOSTART has been applied should be disposed of in accordance with applicable Federal, state/provincial, and local requirements.

## LIMITED WARRANTY

The seller warrants that this product contains a minimum number of *Penicillium bilaiae* colony forming units as specified on this label. The seller makes no other

warranty expressed or implied as to product viability or performance since product storage, use and growing conditions are beyond the seller's control. Seller's guarantee is limited to the terms set out on the label and subject thereto. Buyer assumes the risk to persons or property arising from the use or handling of this product and accepts the product on that condition.

## **NOTICE TO BUYER AND SELLER:**

Seller warrants that this product conforms to the description on the label and is reasonably fit for the purposes stated on the label when used and stored in accordance with directions under normal conditions of use. To the extent permitted by state law, this warranty does not extend to use of this product contrary to label directions or under conditions not reasonably foreseeable by the Seller, and Buyer and User assume the risk of any such use. To the extent permitted by state law, Seller disclaims all other warranties express or implied, including any warranty of fitness or merchantability. To the extent permitted by state law, Seller shall not be liable for consequential, special or indirect damages resulting from use or handling of this product and Seller's sole liability and Buyer's and user's exclusive remedy shall be limited to refund of the purchase price. This product is sold only for uses stated on its label. No express or implied license is granted to use or sell this product under any patent in any country except as specified.