VIGOR FOR SOYBEANS

Vigor® Instruction Guide

www.vigorforsoybeans.com

VIGOR...

...is an at-planting-time soybean seed enhancer

...inoculates and hastens early growth and establishment of the crop

...delivers two types of bio-active performance:
- nitrogen fixing inoculant
- plant growth promoting rhizobacteria

...has a high level of viable bacteria

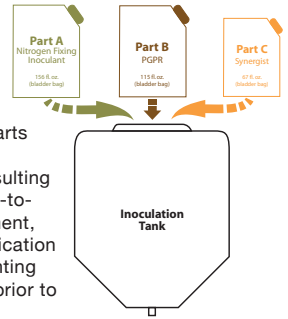
...has advanced on-seed survival

...has yield proven results

tri-pak

The tri-pak contains a three-part system.

When the three parts of the system are combined, the resulting mixture is a ready-to-apply seed treatment, designed for application at the time of planting or up to 60 days prior to planting.



Part A: 156 fl. oz. / Part B: 115 fl. oz. / Part C: 67 fl. oz.

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Part A

Part A contains a nitrogen fixing inoculant concentrate.

Guaranteed minimum bacteria count: 7 billion (7 x 10^9) cfu/ml of Bradyrhizobium japonicum

Mix Part A with Part B (Plant Growth Promoting Rhizobacteria), and Part C (Synergist). This combination provides a ready-to-apply seed inoculant mixture.

IMPORTANT! Prepare only as much VIGOR as will be applied to seed that day. DO NOT OPEN PACKAGE UNTIL THE TIME OF APPLICATION. Once all components have been mixed, it is recommended that this product be applied to seed within 24 hours. If mixed in a dedicated inoculant tank, on-seed survival of 60 days or more can be achieved. Seed treatment products are recommended to be applied sequentially for best results. If mixing VIGOR in same tank with fungicide or insecticides, apply to seed within 4 hours.

Do not allow this product to freeze or to be exposed to extreme heat. Avoid frequent temperature fluctuations. Storage: Store in a cool place between 40°F (4°C) and 77°F (25°C). Store in original container only and do not reuse empty container. **Disposal:** Product is not harmful and may be disposed of by using as irrigation for house plants, bedding plants, gardens, and lawns. Dispose of container and any rinsate in accordance with federal, state and local regulations.

Part B

Part B contains a plant growth promoting rhizobacteria (PGPR).

Guaranteed minimum bacteria count: 1 billion (1 x 10^9) cfu/ml of Azospirillum brasilense

Mix Part B with Part A (Nitrogen Fixing Inoculant), and Part C (Synergist). This combination provides a ready-to-apply seed inoculant mixture.

IMPORTANT! Prepare only as much VIGOR as will be applied to seed that day. DO NOT OPEN PACKAGE UNTIL THE TIME OF APPLICATION. Once all components have been mixed, it is recommended that this product be applied to seed within 24 hours. If mixed in a dedicated inoculant tank, on-seed survival of 60 days or more can be achieved. Seed treatment products are recommended to be applied sequentially for best results. If mixing VIGOR in same tank with fungicide or insecticides, apply to seed within 4 hours.

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Part C

Part C contains a liquid activator and stabilizer synergist.

Mix Part C with Part A (Nitrogen Fixing Inoculant), and Part B (Plant Growth Promoting Rhizobacteria). This combination provides a ready-to-apply seed inoculant mixture.

IMPORTANT! Prepare only as much VIGOR as will be applied to seed that day. DO NOT OPEN PACKAGE UNTIL THE TIME OF APPLICATION. Once all components have been mixed, it is recommended that this product be applied to seed within 24 hours. If mixed in a dedicated inoculant tank, on-seed survival of 60 days or more can be achieved. Seed treatment products are recommended to be applied sequentially for best results.

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Soybean Nutrient Demand

The demand for nutrients depends on the soybean growth stage. Since the soybean seed has high levels of protein, demand for nitrogen is extremely high during seed formation.

	Nutrient	Concentration–lbs of nutrient per bushel raised			Total Crop Nutrient		
		Grain	*Straw*	**Total**	*50 bu*	*60 bu*	*70 bu*
Primary NPK	**Nitrogen**	4.20	1.30	5.50	275	330	385
	Phosphorus	0.40	0.13	0.53	26.5	31.8	37.1
	Potassium	1.25	0.75	2.00	100	120	140
Secondary Nutrients	**Calcium**	0.20	1.50	1.70	85	102	119
	Magnesium	0.23	0.22	0.45	22.5	27	31.5
	Sulfur	0.20	0.25	0.45	22.5	27	31.5

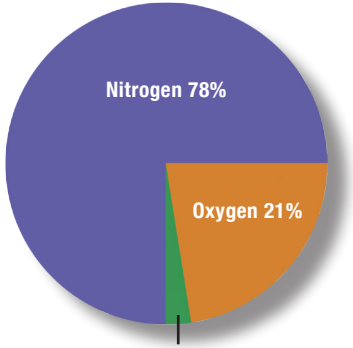
Soybean Inoculation–

The Most Efficient Way To Fertilize Soybeans With Nitrogen

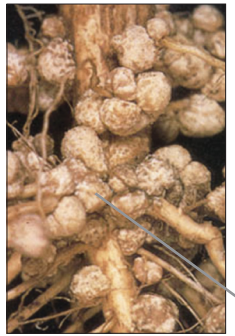
Soybeans need nitrogen to grow just like all other plants. However, soybeans and other legumes, like alfalfa, clover, and peas, can manufacture their own nitrogen through a process called **nitrogen fixation**.

Nitrogen fixation occurs when a rhizobia bacteria in the soil infect legume plant roots, initiating plant response to nodulate and begin a plant process of pulling needed nitrogen from the air.

Composition of Air



Nitrogen Fixation Taking Place



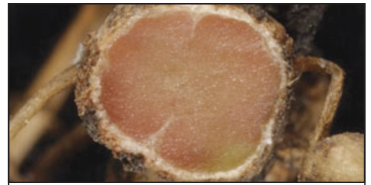
Formation of nodules on the roots.

What Happens:

Seedling roots grow and inoculating bacteria multiply.

The bacteria take nitrogen from the air and convert it to nitrogen fertilizer for the plant.

The bacteria colonize root nodules creating a life giving nitrogen rich environment for the plant.



Large, dark pink/red nodules indicate active nitrogen fixation is taking place within the plant. This is caused by leghemoglobin in the plant nodules; very similar to hemoglobin in the blood of vertebrates. Dark pink/red means alive and functioning!

Plant Growth Promoting Rhizobacteria (PGPR)

PGPR interacts synergistically with nitrogen fixing bacteria (inoculant) to promote improved nodulation and nitrogen fixation.

Phytohormones produced by the VIGOR PGPR, have been shown to promote epidermal-cell differentiation in root hairs that increase the number of potential sites for rhizobial infection, leading to the enhanced nodulation and nitrogen fixation, among many other biological benefits.

Most importantly, VIGOR is designed to deliver premium inoculation with the backup co-inoculation of PGPR, giving the crop a better start and hastened stand establishment.

The PGPR in the inoculation system hastens plant growth resulting in a plant with more "*vigor*".

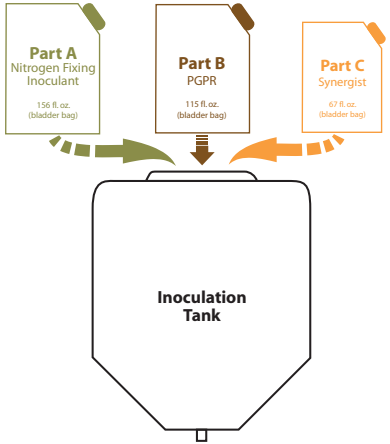
Untreated vs. Treated with VIGOR

Treatments	Stem Length	Root Length	Nodules N° p/Plant	Nodules N° Principal Roots	Nodules N° p/Secondary Roots	Yield (bushels/acre)
Untreated	24	37	23	9	14	31.4
Inoculant Alone	26	39	29	15	14	40.4
VIGOR®	30	41	34	20	18	46.2

Synergist

Liquid activator and stabilizer Synergist is a nutritional and stabilizing agent for use with the VIGOR tri-pak system.

Synergist protects and enhances VIGOR's nitrogen fixing bacteria (Part A) and plant growth promoting bacteria (Part B) to sustain viability of bacteria and extend on-seed stability up to 60 days after inoculation.



Instructions For Mixing Directly Into Inoculation Tank

- All three VIGOR components are to be mixed directly into an inoculation tank.
- Prior to adding to inoculation tank, shake each VIGOR component (A, B and C) well.
- Ensure that seed inoculation system has been properly calibrated.
- Agitate, or recirculate, liquid mixture to ensure proper distribution of bacteria/PGPR and stabilizing synergist.
- IMPORTANT: Once all components have been mixed, it is recommended that this product be applied to seed within 24 hours. If mixing VIGOR in same tank with fungicide or insecticides, apply to seed within 4 hours.
- When all three parts (A, B and C) are combined, the resulting mixture is a ready-to-apply live bacteria and activator/stabilizing agent formulated to inoculate 200 units of soybean seed.
- If mixed in a dedicated inoculant tank, on-seed survival of 60 days or more can be achieved.
- Not a plant food ingredient.
- NOTE: If using additional water with VIGOR, use non-chlorinated water. Refer to page 15 to learn how to prepare non-chlorinated water.

Mixing Instructions for Dilution

In **select circumstances** users may prefer to increase the amount of Vigor solution applied to the seed when using an in-field applicator such as the F.A.S.T. seed treater system.

A user treating 200 units* of soybeans with VIGOR tri-pak might consider doubling the volume from 1.7 fluid ounces per unit of seed to 3.4 fluid ounces per unit of seed. In this instance the following dilution/mixing procedure is recommended:

1) For mixing and diluting, use two clean, unused, 2.5 gallon (10 liter capacity) containers.

2) In the first 2.5 gallon container, mix all three parts of the VIGOR tri-pak system (A, B, *and* C). Close container and shake mixture thoroughly. The resulting mixture volume will be 338 fluid ounces (10 liters).

3) Pour one-half of the contents from the first container into the second container. There should now be two containers one-half full of the VIGOR mixture.

4) Top-off both one-half filled containers with non-chlorinated** water.

5) Secure both 10 liter containers and shake contents thoroughly.

**Unit = 50 lbs of seed.*

Mixing Instructions for Dilution

6) Apply **diluted solution** at a rate of 3.4 fluid ounces per 50 pounds of seed.

IMPORTANT: Diluted solution must be applied to seed within 24 hours of mixing.

**When using additional water, use chlorine-free water. If chlorinated water must be used, prepare water in advance. Pour chlorinated water into a clean unused container and allow water to sit uncovered for 24 to 48 hours. This allows chlorination treatment to liberate from water.

Industry Leading Count of Viable Bacteria

Nitrogen Fixing Inoculant Concentrate: 7 billion (7 x 10^9) cfu/ml of Bradyrhizobium japonicum.

VIGOR for soybeans ultimately delivers living bacteria to the seed that hastens the plant's ability to fix and manufacture the nitrogen it needs to grow. VIGOR is very concentrated so that more viable bacteria can be available for effective inoculation when the plant is ready.

Specifically, 7 x 10^9 bacteria cfu/ml means that every milliliter of VIGOR nitrogen fixing product contains 7 billion viable bacteria! As a result, VIGOR for soybeans delivers an industry leading count of viable bacteria to the seed when properly applied and used according to label instructions.

In addition to improving the inoculation rate under a broad range of conditions, the concentrated VIGOR product results in a very high number of bacteria delivered per seed regardless of the seed size.

VIGOR System Applied Use Rate

This chart details the number of viable nitrogen fixing bacteria delivered per seed when properly applied and used according to label instructions.

Viable Bacteria Delivered per Seed

Seed Size (seeds per lb)	3.4 oz per 100 lbs
2,400	1,345,692
2,600	1,242,177
2,800	1,153,450
3,000	1,076,553
3,200	1,009,269
3,400	949,900
3,600	897,128

cfu/ml	***cfu/ml***	***ml/oz***	***cfu/oz***	***cfu/oz***
7 x 1,000,000,000 = 7,000,000,000	*7.00E+09*	*29.5*	*2.07E+11*	*206,500,000*

Part A contains a nitrogen fixing inoculant concentrate.

Guaranteed minimum bacteria count: 7 billion (7 x 10^9) cfu/ml of Bradyrhizobium japonicum.

More information about nitrogen fixation can be found on pages 8 and 9 of this guide.

Part B contains a plant growth promoting rhizobacteria (PGPR).

Guaranteed minimum bacteria count: 1 billion (1 x 10^9) cfu/ml of Azospirillum brasilense.

More information about PGPR can be found on page 10 of this guide.

Part C contains a liquid activator and stabilizer synergist.

More information about Synergist can be found on page 12 of this guide.

All three parts (A, B & C) are packaged together in one tri-pak case.

For mixing instructions, see page 13 of this guide.

KALO

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KALO, Inc. Overland Park, KS USA

SINTESIS QUIMICA SAIC

VIGOR is Manufactured By
Sintesis Quimica SAIC
Buenos Aires, Argentina