



Inoculant Product Guide

June 2015

INTRODUCTION

Dear Valued Customer,

Since our founding in 1932, KALO's inoculant and seed enhancement products have seen tremendous growth and enjoyed strong support in the distribution and seed industries. KALO, Inc. is proud to distribute the Nature's Aid® line of legume inoculation. We are a company devoted to our products and our customers, which is why we have been in business since 1932!

Our Nature's Aid inoculant products contain billions of live bacteria that are essential in the nitrogen fixating process of garden legume plants. These bacteria, when properly placed in the root zone area of the soil, will actively convert atmospheric nitrogen into a usable form for the plant. Therefore, enabling the plant to produce its own organic source of nitrogen, leading to lush vine growth, and ultimately, greater yields.

All our products are available for immediate shipment to your distribution location. Not only does KALO manufacture and market a variety of inoculants to the vegetable gardener, we are also a manufacturer of agricultural and turf management products. Please visit our website at www.kalo.com to learn more.

This booklet contains information about our inoculant products. I welcome the opportunity to discuss the distribution of Nature's Aid, along with our other inoculant line of products, for your company. You may reach KALO at (800) 255-5196.

Thank You!



Since 1932, KALO has been helping growers and turf managers operate more efficiently.

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ALWAYS READ AND FOLLOW ALL DIRECTIONS ON THE PRODUCT LABEL AND THE LABEL OF THE PESTICIDE BEING USED

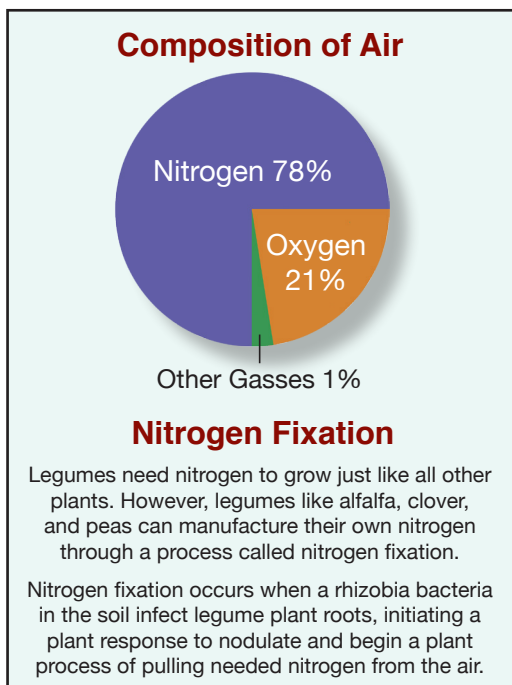
FREQUENTLY ASKED QUESTIONS

All plants require nitrogen for growth, and although this is freely available in the atmosphere, it is not in a form that plants can utilize. Legume plants have the unique ability to fix atmospheric nitrogen by means of bacteria which live in symbiosis on the nodules of their roots. There are numerous species of these bacteria and each has the ability to nodulate different host plants. These bacteria have been isolated and separated into cultures prepared in a peat medium which can be used to distribute the bacteria over the surface of the seed prior to sowing. This distribution over the seed will ensure effective nodulation and thus the process of nitrogen fixation by the host plant.

The beneficial effects of using inoculants can be dramatic. The use of these peat cultures is always advisable when the legume crop or plant is introduced to new land for the first time. In virgin soils the response to inoculant is not spectacular since such soils rarely contain the appropriate rhizobia. There is evidence that inoculant hastens establishment of the pasture, and in most cases more nodules are formed on neutral, rather than on acid, soils.

In some cases, the soil may already contain adequate numbers of effective bacteria from previous sowings of similar legumes. The conditions may also be adverse for bacteria and the host plant, for example, acid soils, waterlogged conditions, soil too dry or from various deficiencies.

It should therefore be recognized that with so many variables, the use of commercial cultures will help to ensure effective nodulation and that the correct strain of rhizobium is available in the soil for the host plant.



FREQUENTLY ASKED QUESTIONS

It should be recognized that mixing of inoculated seed with superphosphate, for even one hour before sowing, will significantly reduce establishment, and prolonged contact will completely eliminate the bacteria. Exposure of the inoculated seed to sunlight, high temperatures, dry conditions, and many chemicals, will also be detrimental to the bacteria, and special precautions need to be taken.

What is an Inoculant?

An inoculant has selected strains of nitrogen fixing bacteria mixed with a peat humus carrier. The granular inoculant is sprinkled into the seed row of garden legumes. When the bacteria are deposited into the soil, they begin to multiply. As the seed sprouts, plant roots grow into the soil. Eventually the introduced bacteria come in contact with a plant root. There is an infection termed a "nodule." The nodule is colonized by the bacteria and nitrogen fixation begins.



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.

Formation of nodules on the roots.

Can I tell if there are nodules on my peas or beans?

Yes. Carefully dig up grown plants and wash the soil from the roots. Nodules will appear as growths on the roots. Dissect the nodule with a knife. A red “bloodlike” substance will denote an active nitrogen fixing colony.



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!

What are the benefits of inoculation?

- **Fertilizer savings:** Due to the nitrogen-fixing ability of legumes inoculated with rhizobia, the need for commercial nitrogen fertilizer is virtually eliminated. Seventy-nine percent of the air we breathe is made up of nitrogen and inoculated legumes are able to convert and use this “free” nitrogen.
- **Higher yields:** All legumes average more pounds per acre when properly nodulated, which increases total crop production and income. For example, studies of soybeans on ground thought not to need inoculant have shown an average increase of 2 or more bushels per acre.
- **Effectiveness of rhizobia strains:** Rhizobia can become lazy over time and fix less nitrogen even though they remain good nodulators. Continuous use of fresh rhizobia will maximize yield benefits, as these rhizobia will out-compete the indigenous rhizobia for root nodulation.
- **Added nitrogen to the soil:** Properly nodulated legumes add 55 to 300 pounds of nitrogen per acre to soil. The exact amount depends on effectiveness of the nitrogen fixation process, type of legume, length of time grown, soil nutrient levels, and the nitrogen already available.
- **Benefits rotated crops:** Nitrogen provided by inoculated legumes grown in crop rotation helps boost yield and lower fertilizer costs for corn and/or small grains.
- **Economical and safe:** Inoculation is a low cost way to ensure nodulation with the proper strain of nitrogen-fixing rhizobia bacteria for increased yield in an environmentally safe manner.
- Improved soil conditions:** Legume plants decompose rapidly, leaving organic matter in the soil, which improves its physical, chemical and biological condition.
- Up-to-date strains:** Rhizobia strains used in inoculation products today are the most effective available.

Methods of Inoculation

There are many procedures for inoculating seed available and the method chosen depends on a number of factors, such as the expected response to inoculation, the trouble the farmer is prepared to go to, the acidity of the soil, and the contact between the seed and the fertilizer, etc.

- **Sprinkle Method:** Moisten seed in a planter box with non-chlorinated water. Add contents of the bag to the wet seed until seed is completely covered. Plant as soon as possible.
- **Slurry Inoculation:** Prepare a slurry by mixing the contents of the packet with cool, clean water. Pour this slurry mixture over the correct weight of seed and mix thoroughly making sure that all the seeds are evenly coated.
- **Dusting:** The peat culture is mixed with the seed and may be carried out in the drill or combine. The seed may be pre-moistened with water.
- **Lime Pelleting:** An adhesive material is used and there are many grades of Methyl Cellulose on the market, some of which are required to be dissolved in boiling water and other in cold water.

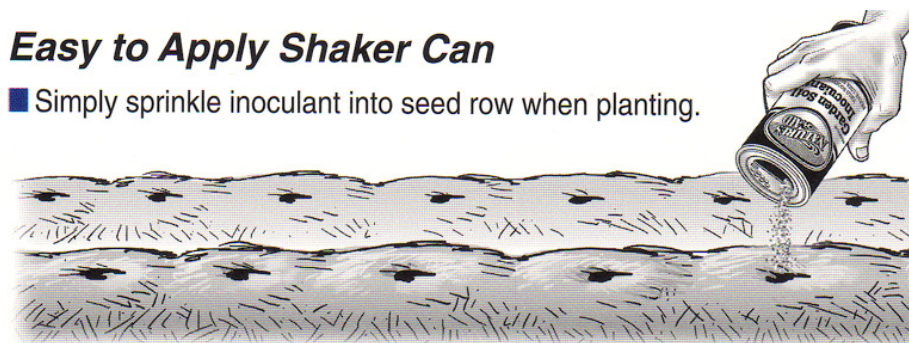
ALWAYS FOLLOW PACKAGE DIRECTIONS FOR BEST APPLICATION METHOD.

How do I apply the inoculant?

- **Shaker Can:** Open the shaker can and liberally sprinkle the granules in the seed row with the pea or bean seed. The quantity within the shaker can will inoculate up to 150 feet of row. You cannot apply too much inoculant. So if you have only 100 feet of row, use it all.
- **Poly Bags:** See slurry inoculation (above), and use same principles according to package instructions.

Easy to Apply Shaker Can

- Simply sprinkle inoculant into seed row when planting.



What are garden legumes?

Legumes are plants which can host nitrogen fixing bacteria. Garden beans, lima beans, garden peas, and sweet peas are garden legumes. Other legume crops include soybeans, peanuts, alfalfa, and clovers. Each of the crops host specific nitrogen fixing bacteria. Nature's Aid inoculants contain specific strains for these vegetables.

Do I need to add nitrogen fertilizer to my beans or peas if I inoculate?

No. Inoculated legumes get all the nitrogen they require from the nitrogen fixing bacteria. The bacteria leave an additional 55 to 300 pounds nitrogen per acre in the crop residue.

Will KALO's inoculants work on other vegetables and fruits?

No. Only garden beans, lima beans, garden peas, and sweet peas can be inoculated by the selected bacteria strains in KALO's Nature's Aid inoculants.

How do the bacteria fix nitrogen?

It is a complicated process, but essentially the bacteria (Rhizobium sp.) take atmospheric nitrogen, which is all around us and process it into a nitrogen form which can be utilized by the legume.

Are the nitrogen fixing bacteria harmful to human, animal or plant life?

No. Rhizobia are nonpathogenic.

What is the carrier?

Pulverized peat moss, similar to packaged peat moss found in potting soils.

Why should a retailer stock KALO's inoculants?

If a retailer sells garden seed, specifically peas and beans, then KALO's inoculants should be made available to maximize the customer's satisfaction with his seed purchase. Inoculant can be a profitable "easy sell" impulse item.

Can inoculants be used in organic production?

Yes, they can. The inoculants have been widely used with satisfaction by many organic gardeners and farmers.

Would Nature's Aid Inoculant be considered organic?

Yes. All KALO's inoculants are 100% organic.

How long has Nature's Aid Inoculant been marketed?

Nature's Aid Inoculant has been marketed through garden catalog merchandisers for over 75 years.

Why does the inoculant bear an expiration date?

The packages contain living organisms. They live, multiply, and if not applied to the soil, die within the package. As with any living organism they must have water and nutrients to survive. The peat carrier provides the nutrients. Moisture is added during the production process. Bacteria have the means to survive until food or water is exhausted. Laboratory studies have shown that viable bacterial numbers will survive if stored properly until the expiration date. It is always advisable to use an inoculant prior to its expiration date.

At the end of the season, what should the retailer do with the unsold merchandise?

After the inoculant passes the expiration date in December, it is no longer legal to sell. Outdated inoculant should be discarded into the normal trash stream. Expired product contains only peat humus.

Do inoculants require special storage or handling?

Inoculants do require more care than the average chemical or seed treatment product because they contain live bacteria susceptible to environmental conditions during storage. Generally, the following recommendations apply:

- Do not open until ready to use.
- Keep inoculant as cool as possible. Minimum: 40°F / Maximum: 77°F.
- Do not allow inoculant to freeze and thaw repeatedly.
- Do not use after labeled expiration date.
- Do not expose to heat or direct sunlight.
- Do not store outside or unprotected from elements.
- Do not allow product to get wet or expose product to extreme humidity.
- Do not use if package seal is broken.
- Destroy unused product after labeled expiration date.
- Product is appropriate for use only on legume seed listed on product label.
- Do not leave in warehouse if fumigants are in use.
- Do not stack product more than two pallets high.

Granular Garden Soil Inoculant

Nature's Aid® (Treats 40 ft Row)

Yield Booster for Garden Peas, Sweet Peas, Beans and Lima Beans

Principal Functioning Agents and Minimum Guarantee of Stated Culture

Bradyrhizobium sp., rhizobium leguminosarum, and R. phaseoli	Contains a minimum of 100 million (1x10 ⁸)/gram
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Nature's Aid Granular Garden Soil Inoculant aids in growth and production of all varieties of garden beans, sweet peas, beans and lima beans. **This product will not aid in the production of soybeans.**

Nature's Aid Granular Garden Soil Inoculant contains billions of live bacteria that are essential in the nitrogen fixing process of garden legume plants. These bacteria, when properly placed in the root zone area of the soil, will actively convert atmospheric nitrogen into a usable form for the plant. Therefore, enabling the plant to produce its own organic source of nitrogen, leading to more lush vine growth and ultimately greater yields.

NOTE: Although the contents of this bag are completely organic, avoid prolonged or repeated skin contact and inhalation. Wash hands with mild soap after use.

Storage and Disposal: Store bag in cool place. Keep closed until use. Protect inoculant bag and inoculated seed from sun, high temperatures and hot winds.

Use before expiration date printed on bag.

(Refer to page 9 for more storage and handling guidelines.)

- Poly Bag = 2.3 oz.
- Carton = 24 Poly Bags
- Case = 6 Cartons

Treats up to 40 Feet (12 Meters) of Row

Item Number: NA40



Directions For Use

Prepare the soil for planting. Make a furrow to the depth required for the seed. Cut off the corner of the bag.

In each 2 foot (0.6 meter) of row	Sprinkle approximately 1 level teaspoonful (5ml) of inoculant into the soil.	Place the seed into the row and cover with fine soil.
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Note: Use only on the specified legume seed.

Granular Garden Soil Inoculant

Nature's Aid® (Treats 150 ft Row)

Yield Booster for Garden Peas, Sweet Peas, Beans and Lima Beans

Principal Functioning Agents and Minimum Guarantee of Stated Culture

Bradyrhizobium sp., rhizobium leguminosarum, and R. phaseoli	Contains a minimum of 100 million (1x10 ⁸)/gram
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Nature's Aid Granular Garden Soil Inoculant aids in growth and production of all varieties of garden beans, sweet peas, beans and lima beans. **This product will not aid in the production of soybeans.**

Nature's Aid Granular Garden Soil Inoculant contains billions of live bacteria that are essential in the nitrogen fixing process of garden legume plants. These bacteria, when properly placed in the root zone area of the soil, will actively convert atmospheric nitrogen into a usable form for the plant. Therefore, enabling the plant to produce its own organic source of nitrogen, leading to more lush vine growth and ultimately greater yields.

NOTE: Although the contents of this can are completely organic, avoid prolonged or repeated skin contact and inhalation. Wash hands with mild soap after use.

Storage and Disposal: Store can in a cool, dry place out of direct sunlight. Do not open until ready to use. Do not use after expiration date. See expiration date on bottom of container. Do not mix with caustic fertilizers or pesticides.

Use before expiration date printed on can.

(Refer to page 9 for more storage and handling guidelines.)

- Shaker Can = 8.7 oz.
- Case = 24 Shaker Cans

Treats up to 150 Feet (46 Meters) of Row, Applied In-Furrow

Item Number: NA15



Directions For Use

Prepare seed before planting. Make furrow and plant legume seed into furrow without covering seed with soil. Using a blunt device, open the container top. Rotate the lid to either shaker holes or wide opening to disperse inoculant.

Apply granular inoculant into the furrow next to the seed.	Apply ample amount* to ensure proper nodulation of emerging roots.	Cover the seed and inoculant with soil.
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Note: Use only on the specified legume seed. To ensure optimum performance of Nature's Aid Garden Inoculant, water plants as directed throughout growing season.

*Over-application is not detrimental and has shown to be beneficial.

Garden Seed Combination Humus

Nature's Aid® (Treats 8 lbs of Seed)

Yield Booster for Garden Peas, Sweet Peas, Beans and Lima Beans

Principal Functioning Agents and Minimum Guarantee of Stated Culture

Rhizobium leguminosarum viceae and phaseoli and bradyrhizobium biovar sp.	Contains a minimum of 200 million (2x10 ⁸)/gram
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Nature's Aid Garden Seed Combination Humus aids in growth and production of all varieties of garden beans, sweet peas, beans and lima beans. This product will not aid in the production of soybeans. Nature's Aid Garden Seed Combination Humus contains billions of live bacteria that are essential in the nitrogen fixing process of garden legume plants. These bacteria, when properly placed in the root zone area of the soil, will actively convert atmospheric nitrogen into a usable form for the plant.

Therefore, enabling the plant to produce its own organic source of nitrogen, leading to more lush vine growth and ultimately greater yields.

NOTE: Although the contents of this bag are completely organic, avoid prolonged or repeated skin contact and inhalation. Wash hands with mild soap after use.

Storage and Disposal: Store bag in cool place. Keep closed until use. Protect inoculant bag and inoculated seed from sun, high temperatures and hot winds.

Use before expiration date printed on bag. (Refer to page 9 for more storage and handling guidelines.)

- Poly Bag = 1.5 oz.
- Carton = 50 Poly Bags
- Case = 4 Cartons

Treats Up To 8 lbs (3.63 kg) of Seed

Item Number: GX08



Directions For Mixing and Use

To prepare the seed for planting, use either the slurry method or sprinkle method below.

Slurry Method:	Place the contents of bag in approximately 4.5 oz (140 ml) of water.	Stir inoculant and water thoroughly to create slurry	Mix the slurry onto the labeled quantity of seed (only use the labeled legume seed).	Mixing is best accomplished using a container outside the planter box.
Sprinkle Method:	Mix/apply at a rate of approximately 2 oz (66 ml) of water per 8 lbs (3.6 kg) of seed.		Moisten seed in a planter box	

Note: Use only on the specified legume seed.

* Add the contents of the appropriate number of bags to the wet seed and mix until the seed is completely covered. Reinoculate seed if not planted within 24 hours.

Exceed Peat Garden Combo

Exceed Peat Garden Combo (Treats 50 lbs of Seed)

Yield Booster for Garden Peas, Sweet Peas, Beans and Lima Beans

Principal Functioning Agents and Minimum Guarantee of Stated Culture

Bradyrhizobium sp. (Vigna), Rhizobium Leguminosarum Biovar Viceae and Rhizobium Leguminosarum Biovar Phaseoli	Contains a minimum of 200 million (2x10 ⁸)/gram
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Exceed Peat Garden Combo aids in growth and production of all varieties of garden beans, peas, and peanuts. This product will not aid in the production of soybeans. Exceed Peat Garden Combo contains billions of live bacteria that are essential in the nitrogen fixing process of garden legume plants. These bacteria, when properly placed in the root zone area of the soil, will actively convert atmospheric nitrogen into a usable form for the plant. Therefore, enabling the plant to produce its own organic source of nitrogen, leading to more lush vine growth and ultimately greater yields.

NOTE: Although the contents of this bag are completely organic, avoid prolonged or repeated skin contact and inhalation. Wash hands with mild soap after use.

Storage and Disposal: Store bag in cool place. Keep closed until use. Protect inoculant bag and inoculated seed from sun, high temperatures and hot winds.

Use before expiration date printed on bag.

(Refer to page 9 for more storage and handling guidelines.)

- Poly Bag = 6 oz.
- Case = 60 Poly Bags

Treats Up To 50 lbs (22.69 kg) of Seed

Item Number: GX50



Directions For Mixing and Use

To prepare the seed for planting, use either the slurry method or sprinkle method below.

Slurry Method (optimum method):	Use a container outside of the planter box for mixing. Dampen the seed with non-chlorinated, clean, cool water at a rate of 8.5 oz of water per 50 lbs of seed. Add 2.5 oz of Garden Combo inoculant per 50 lbs of seed and mix water, seed, and inoculant thoroughly until seed is uniformly coated. Allow 1 to 3 minutes for mixture to dry and then plant as soon as possible.
Applied Directly to Seed:	Mix seed and inoculant thoroughly until seed is uniformly coated. Layering seed and inoculant will aid in this process. NOTE: Maximum seed adhesion will not be obtained by applying this product dry.
For Seed Pre-Treated With Fungicide:	Applying the inoculant dry is recommended for seed that is pre-treated with fungicide. Mix seed and inoculant thoroughly until seed is uniformly coated. Layering seed and inoculant will aid in this process. NOTE: Maximum seed adhesion will not be obtained by applying this product dry.
For New Legume Soils:	For soils that have never been host to the legume being planted, apply at a 1.5 to 2.0X rate, or use Garden Combo with a liquid inoculant.

Note: Use only on the specified legume seed.

* Add the contents of the appropriate number of bags to the wet seed and mix until the seed is completely covered. Reinoculate seed if not planted within 24 hours.

Selecting the Right Inoculant for Your Legume!

Rhizobia are legume specific.
Listed below are species of rhizobia and the species they nodulate.

Culture	Treats all varieties of the following crops:	KALO compatible inoculant
Bradyrhizobium sp., rhizobium leguminosarum, and R. phaseoli	PEAS Cowpeas, Garden peas, Sweet peas, Garden beans, Lima beans	NA40 NA15
Rhizobium leguminosarum viceae and phaseoli and bradyrhizobium biovar sp.	PEAS Austrian winter pea, Garden pea, Purple vetch, Field pea, Flat pea, Common vetch, Hairy vetch, Rough pea, Manantha vetch, Narrowleaf vetch, Faba bean, Lentil, Sweet pea, Tangier pea BEANS Black beans, Cranberry beans, Pinto beans, Field or Canning beans, Kidney beans, Garden/String beans, Great Northern beans, Navy beans, Pink beans, Scarlet Runner beans, Snap beans, Wax beans	GX08 GX50
Rhizobium meliloti and rhizobium leguminosarum biovar trifolii	CLOVER Alsike clover, Ball clover, Berseem clover, Bigflower clover, Carolina clover, Cluster clover, Rabbitfoot clover, Hop clover, Hungarian clover, Ladino, Large Hop clover, Persian clover, Puff clover, Red clover, Seaside clover, Small Hop clover, White clover, Zig Zag clover, Crimson clover. All varieties of Arrowleaf Clover including: Yuchi, Meechi, Apache, Amclo. All varieties of Subterranean Clover and Rose Clover.	ALFA
Rhizobium sp.	CROWNVETCH All varieties of Crownvetch. SAINFOIN All varieties of Sainfoin.	CV15

PACKAGE DESCRIPTIONS

Product Name	Item No.	Treatment	Package Size
Nature's Aid Granular Garden Soil Inoculant	NA40	40 ft. row	2.3 oz poly bag 24 poly bags/carton 6 cartons/case
Nature's Aid Granular Garden Soil Inoculant	NA15	150 ft. row	8.7 oz shaker can 24 shaker cans/case
Nature's Aid Granular Garden Seed Combination Humus	GX08	8 lbs of seed	1.5 oz poly bag 50 poly bags/carton 4 cartons/case
Exceed Peat Garden Combo	GX50	50 lbs of seed	6 oz poly bag 60 poly bags/case
Exceed Peat Crownvetch	CV15	15 lbs of seed	1.5 oz poly bag 50 poly bags/carton 4 cartons/case
Exceed Peat Alfalfa/True Clover	ALFA	50 lbs of seed	6 oz poly bag 60 poly bags/case



NOTICE-READ CAREFULLY

CONDITIONS OF SALE, LIMITED WARRANTY, AND LIMITATIONS OF LIABILITY AND REMEDIES

Read the Conditions of Sale – Warranty and Limitations of Liability and Remedies before using this product. If the terms are not acceptable, return the product, unopened, and the full purchase price will be refunded. The directions of this label are believed to be reliable and should be followed carefully. Insufficient control of pests and/or injury to crop to which the product is applied may result from the occurrence of extraordinary or unusual weather conditions or the failure to follow the label directions or good application practices, all of which are beyond the control of KALO, Inc., the manufacturer or seller. In addition, failure to follow label directions may cause injury to crops, animals, workers or the environment. The Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purpose referred to in the directions for use subject to the factors noted above which are beyond the control of the Company. The Company makes no other warranties or representations of any kind express or implied concerning the product, including no implied warranty of merchantability or fitness for any particular purpose, and no such warranty shall be implied by law. The exclusive remedy against the Company for any cause of action relating to the handling or use of this product shall be limited to, at KALO, Inc.'s election, one of the following:

1. Refund of the purchase price paid by buyer or user for product purchased, or,
2. Replacement of the product used

To the extent allowed by law, the Company shall not be liable and any and all claims against the Company are waived for special, indirect, incidental, or consequential damages or expense of any nature, including, but not limited to, loss of profits or income. The Company, the manufacturer and seller offer this product and the buyer and user accept it, subject to the foregoing conditions of sale and limitation of warranty, liability and remedies.

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