KGS-3:
Plant Growth and Biofungicide Products

KGS Group is an employee-owned, multidisciplinary engineering consulting firm serving clients throughout North America. The company's R&D activity in the bioremediation sector has created applications for the agriculture industry.

Several of the bacteria strains that have been isolated by the company demonstrate a potential utility in agriculture, specifically plant growth, development and biocontrol. KGS is in the process of commercializing a number of strains as microbial inoculation products for agriculture.

TECHNOLOGY AND APPLICATION

KGS Group has developed novel agriculturally beneficial strains that were initially isolated from Manitoba soils. KGS-3 is a novel antifungal strain with plant growth promoting characteristics.

KGS-3 is a Paenibacillus spp. that serves as a biocontrol agent for fungal diseases, including Fusarium spp., Verticillium spp., Leptosphaeria maculans, Rhizoctonia solani, as well as many other fungal crop diseases. The company has had great success in reducing fungal disease in wheat, canola, and potato crops when using this strain. KGS-3 also enhances plant growth by increasing the bioavailability of phosphorus in soils, especially when applied as a seed coating. The KGS-3 strain was isolated from rural Manitoba and is well-adapted to prairie/mid-west conditions and potentially other Northern regions (e.g., Canada, Northern Europe and Northern Asia). The company has performed two years of crop trials, greenhouse trials and lab work to define, characterize and demonstrate the positive impact this inoculant has on crop disease management and crop growth promotion.

KGS-3 associates with plant roots and can also interact with flower and leaf surfaces after foliar application. The company is developing seed coating formulations and foliar application methods for wheat, canola and potatoes. To date, we have observed robust survivability of the strain during the process of inoculation (i.e. high-pressure atomization, drying) and during exposure to organic compounds, metals, and salts found in seed coating products. In 2020 our field trials using seed coating increased yields by 5.7% in wheat (low disease pressure) and 30% when applied to seed potatoes (High disease pressure). Foliar application of KGS-3 to canola for 2 weeks before bolting led to yield increases of 8.5% (high disease pressure). In all relevant cases, disease severity decreased by statistically significant amounts. KGS-3 appears to be an ideal candidate as a biocontrol agent for seed coating or for foliar application.

TECHNOLOGY READINESS LEVEL: 4-5

The company has accumulated two years of lab and greenhouse data. The primary goals for 2021 are:

1. Continue the process of licensing KGS-3 through the Canadian Food Inspection Agency (CFIA) as a plant growth promoter and concurrently through the Pest Management Regulatory Agency (PMRA) as a biocontrol agent.
2. Expand the crop trial program to gather more crop year data in a variety of agriculture regions and climates.
3. Potentially engage agricultural company working with high crop value on vertical or greenhouse farming.
4. Refine seed coating and foliar application methods and inoculum production scale-up for KGS-3.

INTELLECTUAL PROPERTY

The company has filed a patent and PCT Application for KGS-3. USA Provisional Patent Application 62/799,838, filed Feb 1, 2019. PCT Application CA2020/050114, filed January 31, 2020, 30-month deadline is Aug 1, 2022.

KGS is interested in either partnering to commercialize its crop inoculum-lines or licensing IP to another company. KGS is also interested in adding its strain to an existing seed coating treatment.

MARKET NEED

To increase profits, Canadian farmers need to sustainably intensify their cropping methods. Non-GMO microbial inoculants are a valuable tool to accomplish this goal, especially in organic farming. KGS-3 will help both conventional and organic farmers to intensify their production operations in a sustainable manner by managing fungal diseases. KGS-3 was isolated in Manitoba, and the strain is well suited to serve farmers in the Northern hemisphere such as Canada, US, Northern Europe and Asia. KGS-3 appears to unlock the phosphate present in the soil, which can have positive impact on yields and biomass.

COMPETITION

Marrone Bio Innovations, Bayer CropScience, BASF SE, Syngenta AG and Nufarm are selling biofungicides in the market, but to our knowledge, none of their organisms is a member of the genus Paenibacillus, and none, to our knowledge, show good antifungal characteristics against several of the main fungal diseases such as Leptosphaeria spp., Fusarium spp., Verticillium spp., as well as many others. KGS Group maintains that their strains are unique in their function and are protected through patent applications.

TECHNOLOGICAL ADVANTAGE

KGS-3 works especially well as a foliar application on Wheat and Canola near the flowering period to prevent or reduce disease infection. KGS-3 also works well as a seed coat on wheat and potatoes increases yields. Lab results indicate KGS-3 activity against a wide set of fungal pathogens allowing for many crop and disease types to be targeted.

REGULATORY

KGS Group is currently aiming to achieve a license for KGS-3 through the Canadian Food Inspection Agency due to it plant growth promoting properties. At the same time, they are working toward registering KGS-3 as a biocontrol agent through the Pest Management Regulatory Agency.

CONTACT INFORMATION

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