

## Evaluation of different fertilizers in wheat yields

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### Summary

*According to our survey results, yields in the range of 14.6 h/ha have been harvested after application of Darkhan-Rizo bacterial fertilizer. That is, it harvested yields in the range of 5 centner/ha higher than the control, and also it harvested yields in the range of 2.5 centner/ha more than the application of other types of fertilizers such as mineral fertilizers (granules) as well as 2.7 centner/ha higher than the application of organic fertilizer (originated from manure or dung of cattle) and 4.9 centner/ha more than the application of Humate-7B fertilizer, respectively.*

Keywords: Mineral, organic, manure, yields

### Introduction:

Mongolia has an extreme continental climate, and its plant cover is loose, soil humus layer is thinner, has mainly light mechanically compounded soil, low precipitation in winter, dryness in spring. On the other hand, using a short rotation of grain fallow has created agro-ecological conditions such as vulnerable and a poorly-recovered environment.

Under this situation, crop technologies need to be adapted to mitigate these negative consequences of the climate.

The yield of spring wheat (*Triticum Aestivum L*) usually depends on many factors such as its biological features, resource capacity to sustain in adverse external environment, soil-climate, biology and agro technology. Therefore, the application of fertilizers for wheat is main part of the ecological technology to protect the soil and increase yields. The types, norms and dosages of fertilizers should be regulated based on results of agrochemical soil analysis and wheat species and varieties depending on the type of fertilizer combined with planting, the seeds should be sown as close as possible near seeding depth and also before sowing the seeds, spraying and absorbing on the surface are the main way to have a rich harvest as well as improving economic efficiency.

### Materials and methods

The experiment was performed at the experimental field of the Agricultural Technology Research Sector of the Institute of Plant and Agricultural Sciences in Khongor soum, Darkhan-Uul aimag. The total area of the experimental field is 4.5 ha and 5 plots were fertilized with 4 replications. Plots are:

1. Control – non fertilizer
2. Mineral granule
3. Organic manure
4. Humate 7B
5. Darkhan Rhizo bacterial liquid fertilizer

In May 12, the seeds of wheat sort Darkhan-144 were sown at a depth of 5-6 cm using Omichka-SKP-2.1 seeders in proportion of 4.0 million piece per hectare. During sowing, Tebutin-60, the seed disinfectant was applied by mixing it in proportion of 3 liters per 60 liters of water, and Gumat-7B fertilizer in proportion of 3 liters per 60 liters of water for 1 hectare.

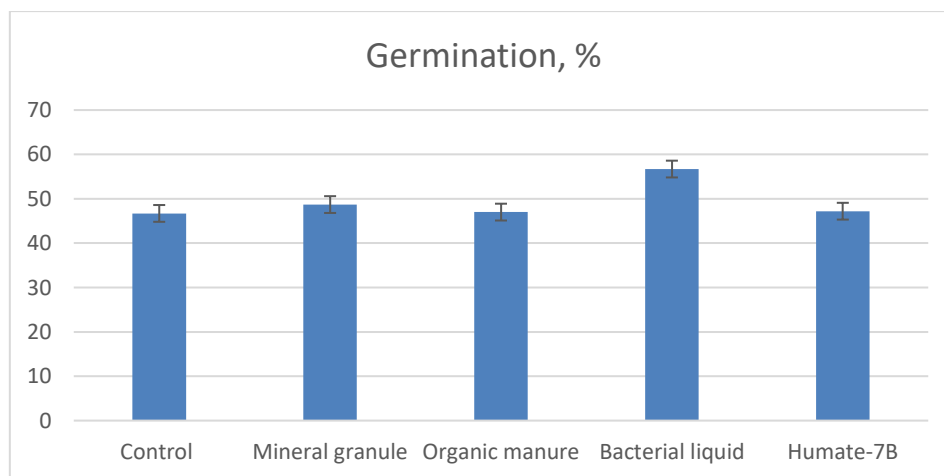
The bacterial liquid biofertilizer were seed treatment before planting /20 liters per 1 tn seed/.

Organic and mineral fertilizers were seed treatment of wheat, proportion of 100 kg per 1 hectare.

### Results

The period of crop yield decline due to unfavorable environmental conditions is referred to as the critical stage period. Researchers divided the growth and development of summer wheat into 4 critical periods.

1st critical period: because there is no powerful organ for the use of moisture and nutrients from seedlings to its full germination, those are quite vulnerable to external shocks. The seeding depth prepared well, adequate nutrients and moisture are a basic condition for overcoming the crisis and unfavorable environment with less damage.



According to the results of our research, the bacterial liquid fertilizer Darkhan-rhizo had a germination rate of 56.7% or 10-15.2% more than control and other fertilizers. Mineral granule fertilizers were 48.7% of germination or 2% more than the non-fertilized control and 8% less than the Darkhan-rhizo fertilizer, though 1.5-1.7% higher than that of organic manure and Humate-7B fertilizers.

### Effects of different biofertilizers on wheat yield

Table-1

Experimental plots	Yield m <sup>2</sup>	Average yield, ce/ha
Control	88,6	9,6
	110,6	
Mineral fertilizer /granule/	111,9	12,1
	132,0	
Organic manure fertilizer	110,6	11,9
	113,3	
Bacterial liquid fertilizer	150,8	<b>14,6</b>
	138,4	
Humate-7B	87,7	9,7
	107,4	

According to the result of the study, the yield of Darkhan-rhizo bacterial fertilizer was 14.6 centners per 1 hectare. This is 5 c/ha more than the control, 2.5 c/ha more than the other types of fertilizers such as the mineral fertilizers /granule/, 2.7 c/ha more than the organic fertilizers /manure/, and 4.9 c/ha more than the Humat-7B fertilizer respectively.

#### Discussion

1. The results of the survey showed that the yield has 14.6 c/ha of seed after application of Darkhan-Rizo bacterial fertilizer. The result is that it harvested yields in the range of 5 c/ha higher than the control, and also it harvested yields in the range of 2.5 c/ha more than the application of other types of fertilizers such as mineral fertilizers (granules) as well as 2.7 c/ha higher than the application of organic fertilizer (originated from manure) and 4.9 c/ha more than the application of Humate-7B fertilizer.
2. Based on the results of our survey, the Darkhan-Rizo bacterial liquid fertilizer increases seed germination processes by 56.7% or in the range of 10-15.2% more than the control and other fertilizers. And also the mineral fertilizers (granules) have a seed germination rate of 48.7% as well as 2% higher than the control without fertilization and 8% less than the Darkhan-Rizo bacterial fertilizer. Further, it has a seed germination rate in range of 1.5-1.7% higher than the organic fertilizer (originated from manure) and Humate-7B fertilizer.

#### Conclusion

The nitrogen fixation and phosphorus solubilizing free living soil bacterias including *Azospirillum brasilense*, *Azotobacter croococcum*, *Azoarcus* have been isolated from major agricultural soils in our institute first time in Mongolia since 2001. Rhizobacteria fertilizer can be used for most of crops for food, fodder and other crops. According to results of agro ecological test in Mongolia, the Rhizobacteria fertilizer increases yield of wheat grain by

23.5-35.3%, barley grain 29.3-34.1%, seed potato yield by 20-65% and yield of vegetable crops /cabbage, carrot, cucumber, turnip et.c/ by 22,2-83,6 %.

In 2017 the plots of experiments was control (non fertilizer), liquid Rhizo fertilizer (10 l/tn, 20 l/tn, 30 l/tn) and dry Rhizobacterial fertilizer. The plots on Rhizo liquid and dry fertilizers application was high efficiency and more than 1.3-6.95 centner/ha, also 12.4-66.3% rate to control.