International Journal of Research Studies in Science, Engineering and Technology
Volume 9, Issue 2, 2022, PP 6-9
ISSN 2349-4395 (Print) & ISSN 2349-4409 (Online)
DOI: https://doi.org/10.22259/2349-4395.0902002

Impact of Fertilizer on the Whole Field of Wheat Leaves Cultivated on Covered Field

Khishigjargal D, Zandraagombo D, Baatartsol B

Institute of Plant and Agricultural Sciences, Darkhan-Uul, Mongolia

Corresponding Author: *Khishigjargal D, Institute of Plant and Agricultural Sciences, Darkhan-Uul, Mongolia*

ABSTRACT

On one hand, Mongolia has the extreme climate of the dry continent, plant cover is scarce, soil humus layer is thin, soil with light mechanic components mostly dominates, precipitation is less in winter and dried strongly in spring; on the other hand, due to the use of short shift of wheat-fallow, it creates a very vulnerable agro-ecologic environment with bad remediation. Non-remedied or zero remedied system is a method of cultivating seeds directly without preparing the soil in advance and without doing any mechanic remediation works. The soil is not affected other than during the cultivation period, therefore, it is the top form of technology of soil protection. The special feature of this method is that all straws and stalks from the previous year are left on the soil surface as a cover.

Technology of covered cultivation is considered as a process of creating artificial soil and bringing the crop field closer to the natural conditions; meanwhile, it opens a suitable environment, where crops can effectively use the most nutritious layer of the soil (0-10cm) at the beginning of their growth.

According to the studies, on average, the wheat leaf area on unfertilized version was 2.6 thous.m2/ha during tilling stage, 3.6 thous.m2/ha during main shooting stage, 3.2 thous.m2/ha during heading stage and 2.7 m2/ha during blossoming stage respectively. Under mineral fertilizer influence, these indicators increased on average by 73.0 % (80.7%, 86.0%, 78.0%, 66.0%, 57.0%), by Rizobacteria fertilizer impact on average by 30.8%, (4%, 44.4%, 5.2%), and by Vozagreen fertilizer impact on average by 26.1%, (46.1%, 33.3%, 12.5%, 33.3%, 5.2%) respectively.

Keywords: *Straw covering, fertilizer, photosynthetic potential.*

INTRODUCTION

Mongolia features an extreme continental, semi-arid to arid climate with short, hot summers and long cold winters. The effects of climate change are expected to worsen, bringing more droughts, heat waves, unreliable rainfall distribution unpredictable. Photosynthesis is the primary physiological process that is affected by changes in growing conditions [5].

The technology of covered cultivation is considered as a process of creating artificial soil and bringing the crop field closer to the natural conditions; meanwhile [6], it opens a suitable environment, where crops can effectively use the most nutritious layer of the soil (0-10cm) at the beginning of their growth.

Creating cover on crop field shall be the basis to determine future tendencies in arable farming by affecting all physical, chemical, and biological processes in the soil and creating the conditions [8], which are closer to the natural by external and internal characteristics. Hence, the current works on remediating crop fields are oriented towards improving the storage of vegetation cover and are aimed to bring the soil wearing to a normal level. Scientists from Canada, Kazakhstan, Russian Federation, and the USA have been conducting such research works continuously since 1970; therefore, there are enough research materials on determining perspectives of arable farming and cultivation.

Photosynthesis converts light energy into chemical energy and has a major impact on crop productivity. Now a day determinate at the photosynthesis process can be increased by more than 10 times the possibility to use solar radiation. if the leaf area is ample it will be absorbing more solar energy.

Wheat of its nutritive properties but also to prevent soil erosion, improve its structure,

landfertility and phytosanitary condition due to reproducible natural resources (photosynthesis and symbiotic nitrogen fixation). Photosynthesis of plants is assigned a major role in the productivity formation since it is the only source of organic matter formation. The photosynthetic activity of crops includes the following parameters: leaf surface area, photosynthetic potential (PP) of the crop, net photosynthesis productivity (NPP), and the PAR utilization quotient (EER PAR). These parameters can be used to state assess of the agroecosystem, productivity, forecast yields, and the effectiveness of the cultural operations.

RESEARCH GOALS AND OBJECTIVE

Identify impact of fertilizer to the leaf area, the main indicator of photosynthesis outcome of the wheat, cultivated on covered field.

Research Methodology

N20P10, Rizobacteria 6 kg/ha, Vozagreen micro bio fertilizer, 2,5 L/ha fertilized versions were tested in the studies to identify impact of fertilizer to the leaf area, the main indicator of photosynthesis outcome of the wheat, cultivated on covered field. The soil of the experimental field was silt loam with pH of 7.11. The organic matter 1.04%, available nutrients such as nitrate nitrogen (NO_3-N) 2.08 ppm, phosphorus (P_2O_5) 1.8 mg/100g, potassium (K_2O) 5.6 mg/100g. The experiment was conducted in a randomized block design with 3 replications.

Soil Studies*:* The following analysis were made under laboratory conditions to the soil ample, taken from the field:

They include:

1. Organic matter
2. Nitrate nitrogen (NO_3-N mg/100g)
3. Phosphorus (P_2O_5 mg/100g)
4. Potassium (K_2O mg/100g)
5. pH (H_2O)

Crop Studies: Wheat phenomena observation was conducted per growth and development phase.

They include:

1. Measurement of leaf area. We measured leaf area of 10 crops per plateau during crop bushing, main stabbing, earring and milk stage.
2. Photosynthesis potential of wheat leaf was determined by A.A.Nichiporovich method.
3. Pure products of photosynthesis were calculated by Kidd, West and Briggs formulas

Survey Results

Main indicator showing the fertility is the content of humidification in the soil. Organic substances of the soil are accumulated slowly with the help of residues and microorganisms under and on the vegetation soil. Organic residues are the source of humidification occurrence and increase of nutritious substances; moreover, it plays vital role in improving physical and chemical characteristics of ground water and improving their fertility.

IMPACT OF FERTILIZER TO THE CONTENT OF SOIL HUMIDIFACTION OF THE WHEAT, CULTIVATED ON COVERED FIELD, 2014-2015

According to the analysis results, 1.08% of humidifaction exists at the depth of 0-20 cm before cultivation on the experiential field soil, which ensures soil with poor nutrition. After harvesting, it reached 0.82% (reduced by 0.26%) on unfertilized field but on fertilized fields, it reduced by 0.08-0.15%.

Effect of fertilizer to the content of soil humus of the wheat, cultivated on covered field, 2014-2015

№	Version	Before planting	After-ripening	Humus reduction
1	Control	1.08	0.82	0.26
2	N20P10		1.00	0.08
3	Rizobacteria 6 kg/ha		0.97	0.11
4	Vozagreen micro biofertilizer, 2,5		0.93	0.15

IMPACT OF FERTILIZER TO THE CONTENT OF SOIL NITRATE NITROGEN OF THE COVERED CROP FIELD

One of the most important indicators to crop feeding and crop formation is the content of nitrate nitrogen, which strongly fluctuates depending on the soil moisture and heat regime during plant growth period. As for our country, the content of nitrate nitrogen of the soil is one of the main factors, which restrict the harvest. In other words, shortage of nitrogen is commonly observed in the light brown soil, which suffers from organic substances.Before the experiment, content of soil nitrate nitrogen is 2.08 mg/kg, which is very low for wheat cultivation according to the degree of supply of nutritious substances. Soil nitrate nitrogen content in unfertilized version was 2.08 mg/kg before cultivation but in June, it reduced to 1.84 mg/kg and in July, when the moisture and heat conditions were favorable, it increased to 2.69, then, reduced gradually and after harvesting it reduced to 1.11 mg/kg.

IMPACT OF FERTILIZER TO THE CONTENT OF MOVABLE PHOSPHORUS OF THE SOIL

When soil is used for cultivation, content of movable phosphorus changes relatively weakly. It is because the movable phosphorus exists in the absorbing complex of the soil as well organic and mineral decomposition process is intensive in light soil with good air conditioning, which regularly compensates its supply. Content of movable phosphorus of covered field soil in unfertilized version was 1.8 mg/kg before cultivation, in June, it increased to 3.2 mg/100 g, in July, it reduced to 2.1 mg/100 g and after harvesting it reduced to 1.7 mg/100 g.

IMPACT OF FERTILIZER TO EXCHANGE POTASSIUM OF COVERED FILED SOIL

Total source of soil potassium is muddy minerals, therefore, much potassium is contained (2-3%) in the soil with heavy mechanic components but relatively less in (0.2-0.3) in sandy soil. Here, amount of exchange potassium to be used easily in plants occupies a small (0.8-1.5%) percent of total potassium. Content of exchange potassium of experimental field soil in unfertilized version was 5.6 mg/100g before cultivation, in June, it reduced to 5.3 mg/100 g, in July, it increased to 5.6 mg/100 g, in August, it reduced to 4.6 mg/100 g and after harvesting it reduced to 3.2 mg/100 g.

IMPACT OF FERTILIZER TO LEAF AREA OF WHEAT (THOUS.M2/HA), 2014-2015

According to our studies, leaf area index in both fertilized and unfertilized versions increased stably since wheat bushing stage (0.26-0.47 m^2/m^2), reached the top amount from main stabbing to earring stages (3.6-4.8 m^2/m^2) but reduced during full ripeness (0.19-3.9 m^2/m^2). Impact of fertilizer was obvious to the wheat leaf area. According to the studies, on average, the wheat leaf area on unfertilized version was 2.6 thous.m2/ha during bushing stage, 3.6 thous.m2/ha during main stabbing stage, 3.2 thous.m2/ha during earring stage and 2.7 m2/ha during blossoming stage respectively. Under mineral fertilizer influence, these indicators increased on average by 73.0 % (80.7%, 86.0%, 78.0%, 66.0%, 57.0%), by Rizobacteria fertilizer impact on average by 30.8%, (3.8%, 66.6%, 34.4%, 44.4%, 5.2%), and by Vozagreen fertilizer impact on average by 26.1%, (46.1%, 33.3%, 12.5%, 33.3%, 5.2%) respectively.

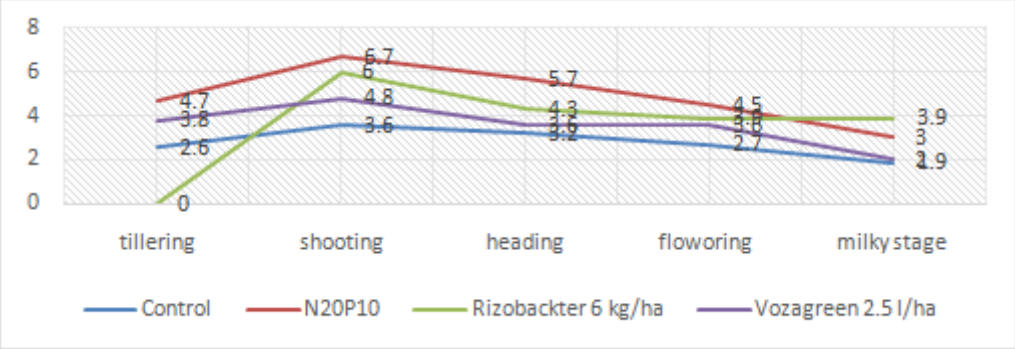
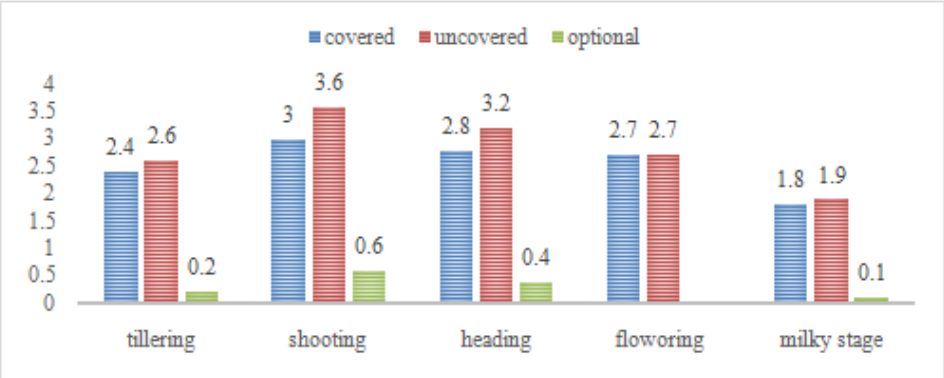


Figure1. *Impact to wheat leaf area (thous.m2/ha*

The graphic shows that wheat leaf area is the highest (by 6.7 thous.m2/ha) under the impact of mineral fertilizer tillering the main shooting stage. (Figure 1.)



Under the impact of straw cover, wheat leaf area increased tillering main shooting stage (0.2-0.6 thous.m2/ha) compared to the uncovered version and increased by 0.4-0.1 thous.m2/ha from heading to milky stages. (Figure 2.)

CONCLUSION

1. According to the analysis results, 1.08% of humidifaction exists at the depth of 0-20 cm before cultivation on the experiential field soil, which ensures soil with poor nutrition. After harvesting, it reached 0.82% (reduced by 0.26%) on unfertilized field but on fertilized fields, it reduced by 0.08-0.15%.Soil nitrate nitrogen content in unfertilized version was 2.08 mg/kg before cultivation but in June, it reduced to 1.84 mg/kg and in July, when the moisture and heat conditions were favorable, it increased to 2.69, then, reduced gradually and after harvesting it reduced to 1.11 mg/kg.Content of movable phosphorus of covered field soil in unfertilized version was 1.8 mg/kg before cultivation, in June, it increased to 3.2 mg/100 g, in July, it reduced to 2.1 mg/100 g and after harvesting it reduced to 1.7 mg/100 gContent of exchange potassium of experimental field soil in unfertilized version was 5.6 mg/100g before cultivation, in June, it reduced to 5.3 mg/100 g, in July, it increased to 5.6 mg/100 g, in August, it reduced to 4.6 mg/100 g and after harvesting it reduced to 3.2 mg/100 g.
2. According to the studies, on average, the wheat leaf area on unfertilized version was 2.6 thous.m2/ha during bushing stage, 3.6 thous.m2/ha during main stabbing stage, 3.2 thous.m2/ha during earring stage and 2.7 m2/ha during blossoming stage respectively. Under mineral fertilizer influence, these indicators increased on average by 73.0 % (80.7%, 86.0%, 78.0%, 66.0%, 57.0%), by Rizobacteria fertilizer impact on average by 30.8%, (3.8%, 66.6%, 34.4%, 44.4%, 5.2%), and by Vozagreen fertilizer impact on average by 26.1%, (46.1%, 33.3%, 12.5%, 33.3%, 5.2%) respectively.
3. Under the impact of straw cover, wheat leaf area increased tillering main shooting stage (0.2-0.6 thous.m2/ha) compared to the uncovered version and increased by 0.4-0.1 thous.m2/ha from heading to milky stages

REFERENCES

[1] Baatartsol, Band other., Irrigation status and rotation need to be followed. Crop rotations theoretical conference. Darkhan, Mongolia, 2012.

[2] Ganbaatar S., No tillage cultivation technology. UB, Mongolia, 1999

[3] Òuul D., Khishigjargal D., Ganbaatar B., Effect of fertilizers on photosynthetic producti vityof barley varieties under irrigate dcondit ion Darkhan, Mongolia, 2012

[4] http://aggie-horticulture.Tamu.edu/earth kind/ landscape/don't-bag-it/chapter-1-the-decomp osition-process/

Citation *Khishigjargal D et al, "Impact of Fertilizer on the Whole Field of Wheat Leaves Cultivated on Covered Field", International Journal of Research Studies in Science, Engineering and Technology. 2022; 9(2): 6-9. DOI: https://doi.org/10.22259/2349-4395.0902002*