Volume 4, Issue 5, May - 2026
ISSN (E): 2938-3781

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

EFFICIENT CULTIVATION OF WHEAT PLANT USING INNOVATIVE FERTILIZERS AND MODERN TECHNOLOGIES ON A LARGE FARM

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Abstract
When learning how to grow wheat, we must first determine that there are two main types of crops: winter and spring. Although each has its own growth requirements and cultivation characteristics, growing spring and winter wheat have more similarities than differences. Good care for both species requires timely watering at various stages of growth, application of NPK fertilizers, and attention to weeds, pests, and diseases. These and other wheat production tasks can benefit from the use of precision farming technologies. When the harvest is ripe, modern agricultural machinery will come in handy again, allowing to quickly collect and prepare the grain for storage.

Keywords: Wheat, fertilizer, cultivation, irrigation, variety, NPK, planting.

Introduction

Wheat is the most important food crop in agriculture. The main part of the world's population's diet is made up of cereals and cereal products. The Uzbek people in particular consume a lot of bread, so the role of wheat grain in our lives is extremely large. 14% of the world's arable land is occupied by cereal crops. Cereal products account for 50% of food trade. Accordingly, there is a high demand for wheat products in the world market.

The Action Strategy of the Republic of Uzbekistan for 2017-2021 "...special attention was paid to the development of intensive methods of agricultural production, primarily the creation of new selection varieties of agricultural crops adapted to local soil-climatic and environmental conditions, the introduction of modern agrotechnologies in cereal fields, especially grain growing"[1]. In addition, the Ministry of Agriculture, in cooperation with OneSoil and Boston Consulting Group, signed an agreement on the use of satellite data in agriculture in Uzbekistan. This agreement provides for the active introduction of digital technologies in agriculture within the framework of the "Smart Agriculture" Concept, and the implementation of work on objective mapping of land areas and crops in Uzbekistan using modern technologies[2].

According to international statistics, currently the total wheat production in the world is 772 million tons, and by 2030 this figure is expected to increase to 850 million tons. In this regard, selection trends and modern technologies aimed at improving the quality of agricultural products are widely spread all over the world. For this, many studies have been conducted both in the world and in our country, and only on the basis of developing and implementing a flexible farming system, taking into account soil and climatic conditions, can a significant increase in the quality of wheat grain be achieved.

Research results

Wheat (Triticum aestivum L.) can be divided into two growing seasons: winter and spring. The crop is classified as "spring" or "winter" depending on when the seed is sown and when it germinates. Farmers choose the crop to grow based on the weather and soil conditions in their area.selects the type of crop.

Fall is the time to start growing winter wheat for the summer harvest. This allows the crop to thrive in areas that experience extreme drought during the summer, taking advantage of fall and winter precipitation. This grain can only grow successfully in areas with milder winters and/or sufficient snow cover to prevent damage from deep, continuous freezing. Young plants need to grow to a height of 10-15 cm to survive the late fall and winter months. The crop's roots are winter-hardy and will continue to grow when temperatures warm again in the spring.

Fall planting may not be the best choice in harsh climates, so spring wheat is often grown in these areas. It also typically grows in areas that receive a lot of rain in the spring and summer.

Optimal conditions for growing wheat.The ideal temperature and moisture levels for growing winter and spring wheat are different. However, both crops have similar growing requirements in terms of soil composition and mineral content. Let's start with the basic favorable conditions for growing wheat.

Water. The ideal amount of water needed to grow a successful wheat crop is 30-38 cm during the growing season. Climate, soil moisture content, length of growing season for a particular wheat variety, andof plants'growth stageare the most important factors in determining how much moisture your crop needs.

The "conditioning" of winter wheat makes it more adept at adjusting its development in response to water scarcity, which explains why the spring crop is sensitive to dry growing conditions.

Temperature.Winter wheat goes dormant during cold periods in its early vegetative stage, and temperatures must drop to at least freezing for the plant to enter its reproductive cycle. That is, the winter crop will not germinate until it has endured prolonged cold conditions below 4 °C. Temperatures above 32 °Cheat stress in plantsand can lead to yield reduction.

Spring wheat cultivation, on the other hand, requires temperatures between 21 and 24°C for best results. In terms of cold/heat limits for successful cultivation, spring crop varieties can grow at temperatures between 4 °C and 35 °C. Maintaining temperatures within this range is critical for wheat cultivation at certain stages of plant development. For example, seed germination temperatures below the lower limit and ripening temperatures above the upper limit are both associated with reduced yields.

With EOSDA Crop Monitoring, you can access current and historical weather conditions in your wheat fields. The 14-day forecast includes all the information you might need to plan your field operations, such as expected wind speed, wind direction, and cloud cover.

Soil and nutrients.Knowing what soil wheat grows inincrease crop productivityis essential for. Deep, fertile sandy soil with good drainage and aeration is ideal for growing any variety. Conversely, soils rich in iron, sodium, and magnesiumPeat types of soil are considered very unfavorable for growing this grain.

Optimal wheat cultivation is in the pH range of 5.5 to 7.5 (slightly acidic to neutral soils). Low soil fertility and salinity are detrimental soil conditions for wheat cultivation. Salinity problems are more common in irrigated fields.Soil salinitycan negatively affect plant viability, primary and secondary tillage, leaf and ear yield, and water availability.

Sowing wheat.The first step is to determine the optimal time to plant wheat, which varies from variety to variety. If you want to avoid the negative effects of frost on your growing crop, you should choose a planting time for winter wheat in late summer and early fall, about six to eight weeks before the first frost. The first months of spring, when the soil is still cold, are best for planting spring wheat. The general procedures for planting wheat are as follows:

Tillage. First of all, prepare the field before planting wheat. The recommended depth of tillage is (15 cm). When you are finished, the field should be as flat as possible

Spread compost (if needed). Covering light brown, overly dry, or slightly coarse soil with compost improves fertility and soil amelioration. This improves plant growth.

Broadcasting seeds. This method of sowing wheat involves scattering the seeds on prepared soil, placing them about 7 cm wide. If youoh'intercroppingIf you prefer, increase the distance between wheat rows by 20 cm. The optimal sowing depth for wheat seeds is about 1 cm, but a 4 cm layer is ideal for spring crops, and a 6.5 cm layer is recommended for winter wheat. Never cover the seeds with more than 7.5 - 8 cm of soil. The sowing rate is 70-110 kg per hectare in fertile soils, and 170-200 kg per hectare in irrigated areas. Watering. Water the plants as soon as possible after planting and remember to keep the newly planted area moist until the plant has sprouted and is strong.

Use the Field Activity Log feature in EOSDA Crop Monitoring to organize and track your field work. To ensure your wheat production is running smoothly, you can track jobs and worker comments across all your fields at once with this calendar-style tool.

Fertilization

Before sowing wheat, 10-15 tons of manure, 40-80 kg of phosphorus, 40-100 kg of nitrogen, potassium are applied to the land, and the field is also fertilized during the growing season, and in waterlogged areas, it is irrigated 2-3 times during the growing season[4]. NPK (nitrogen, phosphorus, and potassium) is the fertilizer required for wheat cultivation. Current high-yielding varieties are more efficient at extracting nitrogen (N) from the soil, which makes them rich in protein. Remember that grain yield is inversely proportional to the amount of protein in the grain. Therefore, it is very important for farmers to maintain an ideal balance between protein content and yield when planning nitrogen fertilization schedules and doses.

Watering. Timely irrigation is essential for effective wheat production. Early irrigation for winter varieties helps plants emerge more quickly and evenly, promotes vigorous crop growth, and yields more per acre. Spring crops also require more water during the germination and early root development stages. Gentle, frequent irrigation is recommended to accelerate the emergence of young seedlings and ensure early root development.

Wheat floweringThe most water is needed during the flowering period, an average of 5 cm per day. The soil should be sufficiently moist before flowering begins so that the crop can grow well during the flowering stage and the early stages of grain.

During drought periods, irrigated crops are less likely to suffer from leaf diseases such as yellow rust (Puccinia striformis West) and Stagonospora nodorum spot, as well as diseases such as fusarium. However, these problems can return if there is sudden rain after irrigation, as most fungal infections that attack crops thrive in moist, humid environments.

The most common weeds growing in wheat crops belong to the families Brassicaceae, Asteraceae, Ranunculaceae, Geraniaceae, Poaceae, and Rubiaceae. In addition to competing with crop plants for water and nutrients, weeds also provide habitat for predatory insects and disease-causing fungi such as oidium.

Spring wheat takes about 100-130 days to grow, while winter wheat takes about 180-250 days to grow. Winter wheat has a growing season of up to 90 days when it goes dormant during the cold months. Warm weather (especiallysoil temperature) and factors such as rainfall and irrigation affect how long it takes for a plant to grow.

Harvesting wheat. Thankfully, we no longer have to harvest wheat in large quantities by hand. Today, combine harvesters harvest large areas of crops. This agricultural machine harvests, threshes, and threshes the grain all at once. The combine also chops the crop residue into small pieces, which are then spread across the field through the rear discharge.

To avoid significant loss of grain quality, wheat should be harvested as soon as it has dried to 12.5% moisture content. If you are concerned about loss of quality due to rain or bad weather, a slightly higher moisture content (e.g. 18%) may be beneficial. To prevent the development of fungi and mycotoxins during storage, the grain should be dried to a moisture content of at least 12% after harvest.

Processing wheat grain after harvest. A moisture content of less than 12% allows for safe storage of grain for a long time. When storing grain in bags, its moisture content should be even lower, namely 9%. Grain dryers are used to reduce the moisture content of harvested wheat to this level.

To sum up, It is not the easiest crop to grow. However, if you follow the tips in this article and use modernagriculture'from social technologiesIf you use , you can get a good harvest even if you do not have much experience in wheat cultivation. Now you also do not need to spend a lot of time, money or effort to be aware of the situation in your fields. The use of modern, advanced techniques and technologies is creating the basis for truly effective wheat cultivation.

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