Wheat Production Technology

Wheat is a fundamental staple crop in Khyber Pakhtunkhwa (KP), Pakistan, playing a crucial role in the province's agrarian economy. Approximately 80% of KP's population resides in rural areas, with agriculture serving as their primary livelihood. The sector contributes 22% to the provincial GDP and employs 40% of the labor force. Despite this, about 31% of the population remains food insecure, with high rates of malnourishment.

The provincial government has initiated the Wheat Productivity Enhancement Project in KP. This ongoing project aims to increase per-acre wheat productivity by ensuring the supply of certified seeds and fertilizers at subsidized rates, promoting mechanized farming through the provision of modern machinery, and disseminating improved agricultural technologies. The project's objectives align with the KP Agriculture Policy 2015-2025, focusing on enhancing sector productivity, addressing food security, and improving natural resource management.

Despite these efforts, KP's wheat production still falls short of meeting the province's annual consumption needs. The province produces approximately 1.4 million tons of wheat annually, while the consumption requirement is around 5 million tons. This gap underscores the importance of ongoing initiatives to boost wheat productivity and achieve food security in the region.

Land Preparation:

1. Plowing:
    - Plow the soil when it is in a Wattar condition (adequate moisture) to ensure effective preparation.
    - Break clods in the field using a rotavator, or manually with Kudals if necessary.
    - In case of heavy weed infestation, perform 2-3 plowings to eliminate weeds.
    - At the onset of the monsoon, carry out deep plowing to conserve soil moisture.
    - For sowing, plow the field twice and finish with plankings to achieve a fine tilth.
2. Soil Testing:
    - Conduct soil tests to determine pH levels and nutrient requirements.
3. Depth and Aeration:
    - Plow the land 2-3 times to a depth of 8-10 inches to break clods and aerate the soil.

4. Leveling:
    - Level the land to ensure uniform water distribution.
5. Manuring:
    - Apply 10-15 tons of farmyard manure (FYM) per acre to enrich the soil.

Proper land preparation is essential to achieve a high wheat yield. The field should ideally be plowed 5-6 times for thorough soil preparation.

Sowing Time: The most suitable time for wheat sowing is from **November 1 to November 30**.

- Rainfed areas: October 25 to November 20.
- Irrigated areas: November 1 to November 25.

For optimal results, sow wheat in **late October to early November**. Specifically, in the **Bannu Division**, the ideal sowing period is from **October 25 to November 25**.

Seed Rate: The required seed rate varies based on the sowing time and method:

Drill Sowing

- Early planting (before November 1): 45 kg/acre
- Normal planting (November 1-25): 50 kg/acre
- Late planting (after November 25): 55-60 kg/acre

Broadcasting (Manual Sowing)

- Early planting (before November 1): 50 kg/acre
- Normal planting (November 1-20): 55 kg/acre
- Late planting (after November 20): 60-65 kg/acre

General Guidelines

- For normal sowing, use 50 kg of seed per acre.

- For late sowing (after November 30), increase the seed rate by 5%, typically requiring 60 kg/acre.
- Adjust the seed rate based on sowing time and method for optimal germination and yield.

Sowing method:

1. Sowing Techniques:
    - The drill method is highly recommended for uniform emergence and higher yield.
    - Farmers in hilly areas can use bullocks for line sowing.
    - Broadcasting is commonly used but less efficient compared to the drill method.
    - Alternative methods, such as sowing on ridges, beds, or wide beds, conserve 20-25% water.
2. Seed Depth:
    - Sow seeds at a depth of 2-3 inches for optimal germination.
3. Row Spacing:
    - Maintain a row spacing of 9-12 inches for better crop establishment.
4. Regional Practices:
    - In the irrigated areas of Bannu Division, the broadcasting method is traditionally used, but farmers are being encouraged to adopt the drill method for its benefits.
    - In rainfed areas, wheat is cultivated using either the drill method or the pora method.

Note: The drill method is the most efficient and recommended technique for wheat cultivation across all regions.

Fertilizer Requirements:

Fertilizer Recommendations for Wheat Cultivation

General Guidelines

1. **Fertilizer Types and Timing**:

- Apply 1 bag DAP**,** ½ bag SOP (or MOP)**, a**nd 1 bag Urea per acre at the time of sowing.
- Apply the remaining 1 bag Urea after the first or second irrigation. Splitting urea application has shown good results in some areas.

2. **Recommended Rates**:
    - 120-150 kg of Urea**,** 60-80 kg of DAP**,** and 30-40 kg of SOP per acre.

Fertilizer Recommendations by Soil Type

Soil Type	**N (kg/acre)**	**P (kg/acre)**	**K (kg/acre)**	**Fertilizer in Bags/acre**
Low fertility soil	64	46	25	2 bags DAP + 2 bags Urea + 1 bag SOP/MOP
Medium fertility soil	54	34	25	1.5 bags DAP + 1.75 bags Urea + 1 bag SOP/MOP
High fertility soil	46	30	25	1.25 bags DAP + 1.5 bags Urea + 1 bag SOP/MOP

Fertilizer Recommendations by Rainfall

Rainfall Zone	**N (kg/acre)**	**P (kg/acre)**	**K (kg/acre)**	**Fertilizer in Bags/acre**

Low Rainfall (<350mm)	32	23	12	1 bag DAP + 1 bag Urea + 0.5 bag SOP/MOP
Medium Rainfall (350-600mm)	40	28	12	1.25 bags DAP + 1.25 bags Urea + 0.5 bag SOP/MOP
High Rainfall (>600mm)	48	34	25	1.5 bags DAP + 1.5 bags Urea + 1 bag SOP/MOP

Fertilizer Application Timing:

- Apply SOP and DAP at the time of sowing.
- Split Urea application, completing it by February 20.

Notes

- Fertilizer needs depend on soil fertility, organic matter, and the previous crop grown.
- Use soil tests to determine exact requirements for optimal wheat yield.

Recommendation for fertilizer application:

- Phosphate and potash fertilizer should be applied at the time of sowing and nitrogenous fertilizer urea should be applied two split dosses at sowing, first irrigation and second irrigation.

Irrigation/water requirements:

Irrigation Method

- Use flood irrigation or **s**prinkler irrigation**,** depending on resources and field conditions**.**

General Recommendations

- Wheat typically requires **4-5 irrigations**, depending on soil type**,** temperature**,** and moisture levels**.**

- If only three irrigations are possible, ensure they are at 15-20 days after sowing**,** the booting stage, and the milking stage**.**

Diseases of wheat

S,No	Name of disease	Description and Management	
1	**Yellow rust**	• Yellow /Stripe rust caused by *(Puccinia striformis)* • Yellow pustules- Presents in long stripes • Easily wiped off with finger Symptoms appears early in spring • Development is most rapid in cool and wet weather. • Sporulation 8-15^{o}C • First attack older leaves	

		• Watch hotspot in the crop • Resistant varieties cultivation best option • Appropriate fungicides application for diseases control. e. g Tilth or Nativo etc	
2	**Leaf rust**	• Leaf / Brown rust caused by (*Puccinia recondita) Pustules are small, orange to orange-brown and are randomly dispersed on leaves.* • *Develops best during moderate temperatures (30-35^{o}C)* • *Many races (changes or shifts quite readily)* • *4-10-day cycles are all that is necessary for rust to develop from a few pustules to an epidemic.* • Resistant varieties cultivation best option • Appropriate fungicides application for diseases control g Tilth or Nativo etc •	

Weed Control in Wheat Crops

Weeds cause up to 30% yield loss in wheat, competing for resources, reducing grain quality, harboring pests, and increasing cultivation costs. Effective control can significantly boost production.

Types of Weeds

1. Narrow-Leaf Weeds: Wild oat, Phalaris minor
2. Broad-Leaf Weeds: Chenopodium (Bathua), Rumex, wild spinach

Weed Control Methods

1. Physical Control (Eco-Friendly):

- Use clean seeds and prepare the land thoroughly.
- Perform deep plowing and hoeing for weed removal.
- Maintain clean irrigation channels.
- Use higher seed rates in weed-prone areas.
- Sow crops with the drill method during optimal moisture conditions.

2. Chemical Control:

- Select appropriate herbicides based on weed type.
- Apply after the first irrigation when soil is moist.
- Use recommended dosages and avoid spraying in strong winds.
- Ensure uniform spraying and check equipment beforehand.
- Always wear protective gear during application.

Additional Measures

- **Crop Rotation:** Alternate wheat with legumes to disrupt weed cycles and improve soil fertility.
- **Prevent Proliferation:** Regularly clean irrigation channels and manage weeds before they seed.

By implementing these strategies, wheat yield losses from weeds can be minimized, leading to higher productivity.

Harvesting and Post-Harvest Management of Wheat

Proper harvesting and post-harvest management are crucial to protecting wheat crops from adverse weather and ensuring high-quality grain yield.

1. **Timing:**
    - Harvest wheat when it is fully ripened, typically from late April to early May**.**
    - Begin harvesting when grain moisture content is between 20-30%**,** allowing the wheat to dry in the sun for easier threshing.
    - Avoid delayed harvesting, as overripe wheat can lead to grain shattering and broken ears, reducing yield.
2. **Methods:**
    - Use a combine harvester for efficient harvesting, ensuring grain moisture is at 14% or lower**.**
    - For manual harvesting, prefer mornings or evenings to minimize shattering.
    - Avoid leaving the harvested crkk7op scattered in the field; make bundles to protect it from wind or rain.

Threshing

- Thresh the wheat soon after harvesting to separate grains from chaff.
- After threshing, dry the grains in the sun until moisture content is reduced to 12% or lower**.** This helps prevent spoilage and protects the grains from pests such as beetles and weevils.

Precautions for Seed or Grain Storage:

1. Clean storage facilities thoroughly and spray with an appropriate pesticide before storing.
2. Ensure the grain is cleaned and its moisture content is reduced to 9-10% before storage.
3. Use new sacks for storage; if reusing old ones, spray them with pesticides.

4. Inspect stored grains every 15-20 days. For pest infestations, fumigate using 2-3 tablets of phosphine per ton.
5. After fumigation, ventilate storage and remove dead pests. Repeat inspections during July and August.

Recommended Wheat Varieties

For optimal wheat production, selecting the right variety based on region and conditions is crucial.

- Irrigated Areas: Tanda-2023, Khyber-2023, Pirsabak-2023, Taskeen-2022, Swabi-1, Zarghoon-2021, Abaseen-2021, Gulzar-2019, Khaista-2017,Tarnab Gandum-1,Tarnab Rehbar,Tarnab Gold
- Rainfed Areas: Tanda-2023, Khyber-2023, Pirsabak-2021, Zarghoon-2021, Wadaan-2017, Pirsabak-2015, NIFA Lalma-2013, Shahkar-2013, Tarnab Gandum-1

Specific Conditions

- Late Planting: Abaseen-2021, Gulzar-2019, Pirsabak-2015, Paseena-2017, Tarnab Rehbar

- Suboptimal Irrigated Areas: Tanda-2023, Abaseen-2021, Wadaan-2017.
- High Input Environments: Taskeen-2022, Gulzar-2019, Pirsabak-2021, Pirsabak-2019.
- Low Input Environments: Tanda-2023, Abaseen-2021, Wadaan-2017.

Local Recommendations (D.I. Khan & Serai Naurang)

For D.I. Khan:

- Ratta Kulachi-2023, Tanda-2023, Pirsabak-2021, Gulzar-2019, Wadaan-2017, Paseena-2017.

For Serai Naurang:

- Naurang-2023, Ratta Kulachi-2023, Tanda-2023, Zarghoon-2021, Pirsabak-2019, Gulzar-2019.

These varieties are disease-resistant, high-yielding, and well-suited for the specific environments in the region.