APPENDIX C

PROJECT : BUILDING RESILIENCE TO CLIMATE RISKS

Contents

RESULTS

The assistance of Farmer Development Coordinators was enlisted in the stipulated study regions of the Eastern Cape, North West and Free State provinces, for maize and the Western Cape for wheat. The maize coordinators were located in Kokstad, Mthatha (EC), Lichtenburg (NW) and Welkom (FS) and this is where the farmer meetings were held.

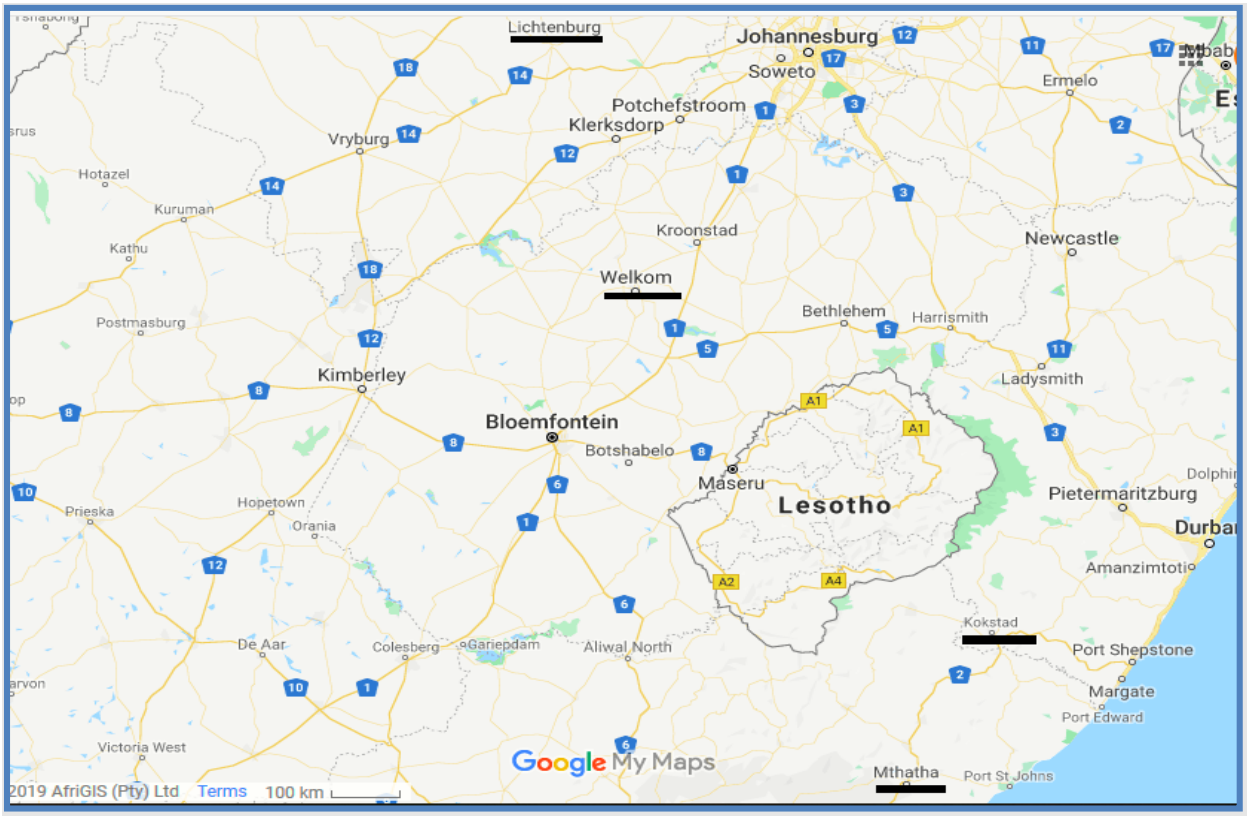

Figure 1. Location of Maize meeting sites – underlined.

- ***Specific objectives***

Each objective's progress is discussed for each sub-region below. Yield and climate data were not always available, so some assumptions have been made and some proxy data has been used.

Eastern Cape – Kokstad and Mthatha

1. Impact of Climate Variability on Yields:

While overall yield data for the EC districts of Kokstad and Mthatha is not available, the information obtained from farmers shows a remarkable difference between the two areas (Around 2-4 t/ha in Kokstad and 4-6t/ha in Mthatha) mainly due to soil and climate differences, but perhaps also due to the scales at which the crop is grown. Kokstad farm sizes of those interviewed are of the order of 20-100+ ha, while in Mthatha the most common area planted to maize is 2 ha. The variability of yield is not, according to the farmers, significantly linked to the variation of amount of seasonal rainfall (see Fig. 2, 3), but more due to the timing.

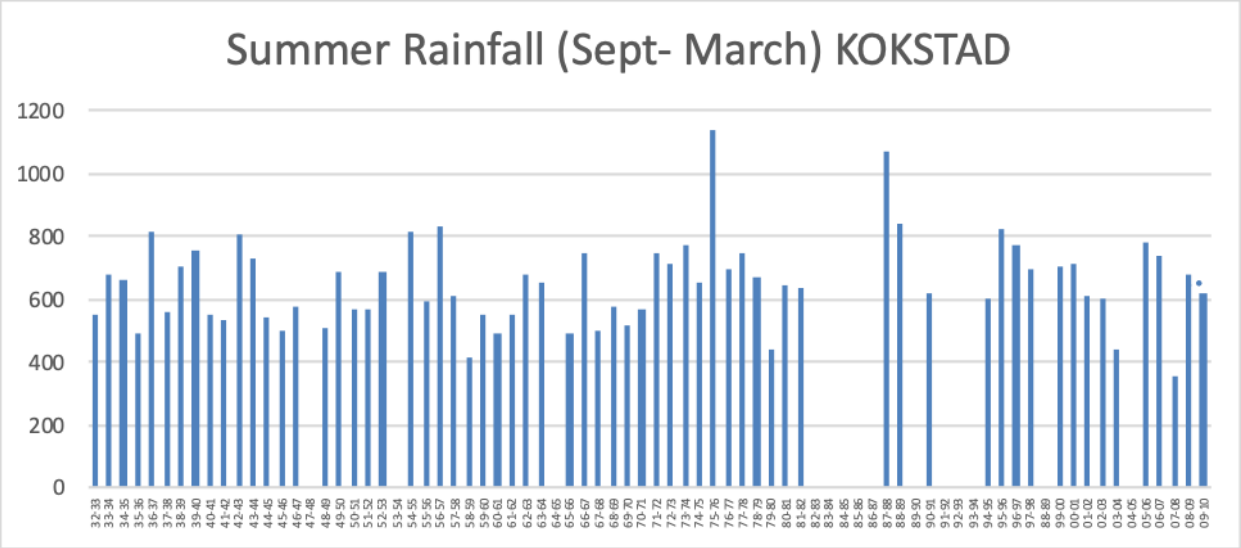

Figure 2 Kokstad Historical Rainfall

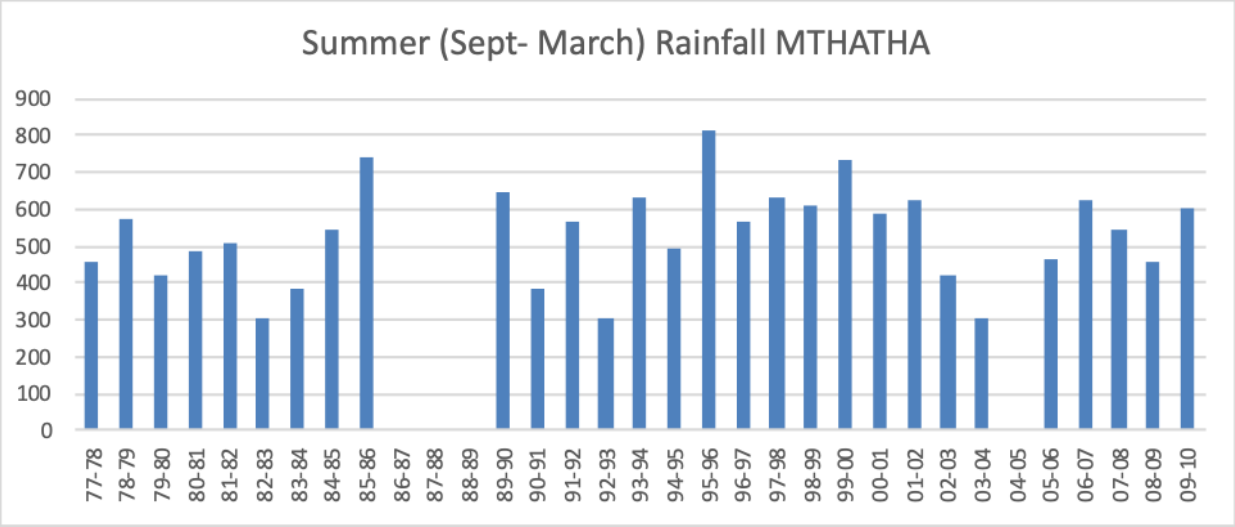

Figure 3 Mthatha Historical Rainfall

2. The Main Climate Risks that Impact on Crop Yield:

The main risks facing the farmers are mainly a) timing of onset of rainfall and b) extreme events. If the onset of rainfall (normally Sept – early Nov) is normal or early, planting can take place well before December and the crop is ready before the first frost (though late season rain can cause fungus problems). However, if the rain onset is late (from Dec-Jan) then the planted maize can be subjected to very high temperatures during the early growth stage and cool temperatures during ripening, as well as early frost in April/May when the drying is incomplete.

3. The Relationship Between Climate Risk and the Profitability:

On the other hand, extreme rainfall amounts, whether low or high have consequences for yield, though it seemed the worst impacts are from extended dry periods (of 2-3 weeks) and heavy rainfall, which causes flooding that damages shoots and roots. It was also mentioned that hail was occurring more frequently. While farmers were hesitant to say that the climate

was changing, it was a common thread that the rainy season seems to be later more often and hail more frequent than in the past.

Comment: Many farmers noticed a change of rainfall onset and increases in extreme temperature and rainfall events. More specifically some of their responses are:

- Less maize planted in 2018 than usual due to late rainfall onset (10 Dec in this area), and which was followed by droughts in January and flooding in February (yield was only around 2t/ha). Normally onset is around mid-September, and still acceptable in October/November
- If onset comes after December, then maize is usually replaced by oats, beans (for selling), tef, fodder (for selling), radishes
- An ongoing problem is that small scale farmers, due to a lack of storage facilities, and the need to repay loans, sell at harvest time and receive a lower price.
- An option during late onset is to focus on improving livestock.

Free State - Welkom

1. Impact of Climate Variability on Yields:

Maize yields achieved in the latest season varied between 1.5 (lowest) to 6 t/ha (highest). Sunflower yields are between 1-1.1 t/ha. Historically maize yields in the region have been increasing over the long term, but the annual yields vary depending on the conditions. The benefits of a high yielding season are often countered by the corresponding lower prices.

2. The Main Climate Risks that Impact on Crop Yield:

The main risks facing the farmers are mainly a) timing of onset of rainfall, which seems to be later, b) extreme events such as storms, heavy rain and hail, and c) very hot temperatures during planting and the following weeks. Long term summer season rainfall seems to be decreasing, but not significantly.

3. The Relationship Between Climate Risk and the Profitability:

A high temperature range is also detrimental to crop growth, and these have been experienced more often (a Tx/Tn range of more than 10 degrees). If temperatures are too high, especially over 40 deg, the soil gets too hot, and crops die. They can recover with rain and lower temperatures, but with a lower yield. (Sunflowers can't be planted in heat).

4. Climate Risk Responses
    - Access info from seed companies, fertilizer and other commercial farmers with regards to trends, improving relationships with providers to rationalize inputs.
    - Adjust applications accordingly. Look at alternative crops – dry beans, if machinery is available
    - Investigate options for irrigation
    - Adjust soil preparation – no ploughing, min till, no disc, conserve water, soil cover, but trials in alternative crops needs effort and money

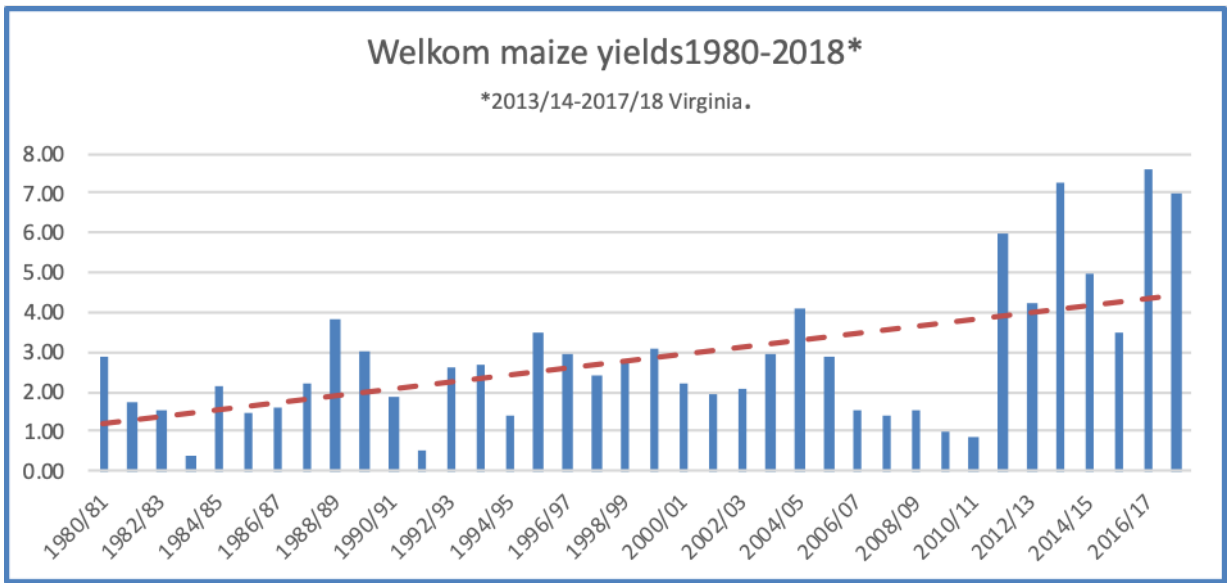

Figure 4 Welkom maize historical maize yields

The rainfall/yield correlation is not clear in Figs. 4 and 5. For example, the overall seasonal rainfall for 2008/9 and 2009/10 was marginally below average (green line), but yields were less than 1t/ha. Individual within-season variation will have to be interrogated to determine if the low yield was climate related, or if other reasons were to blame.

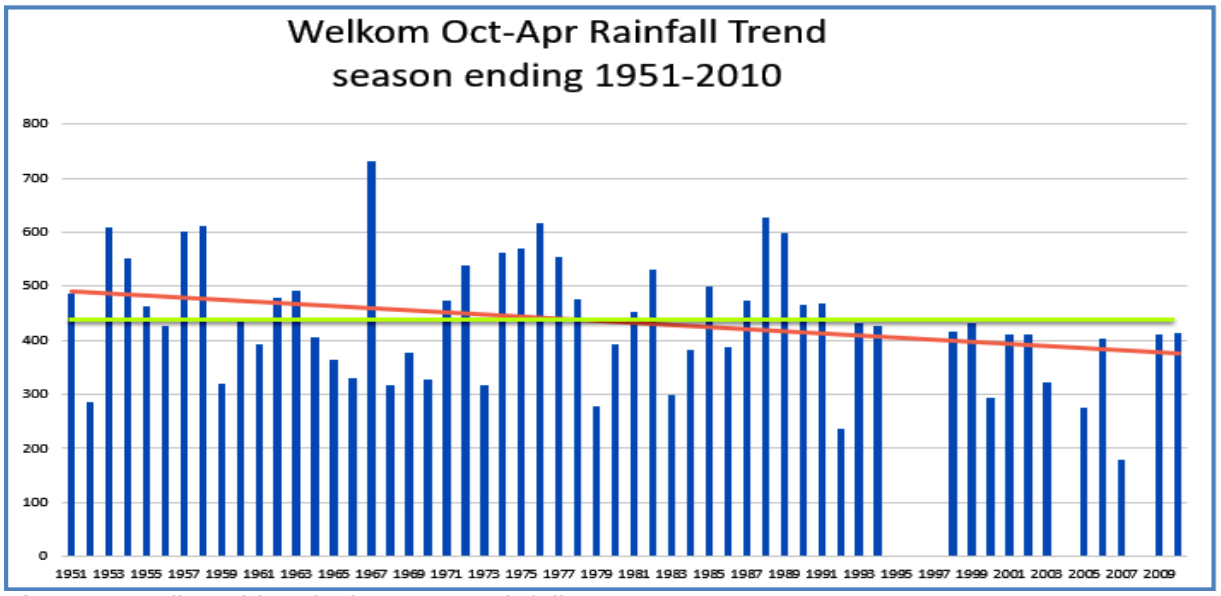

Figure 5 Welkom historical summer rainfall

Comments: When interrogated about changing climate patterns, the following were mentioned by the farmers:

Rainfall

- Later rains apparent – now only start in Nov/Dec
- More storms with heavy/patchy rain
- Seasonal rain same or less but not well spread out
- More hail experienced during February leading to more damage

Temperature

- Hotter in general, with mild winters, with late summer heatwaves
- February heatwaves are extending from a week to 14 days
- Temperature ranges are increasing – with cold spells interspersed with heatwaves, leading to unfavourable conditions for plants
- Weeds prefer these heatwaves
- El Niño conditions seem to be more frequent

Extremes

- More heatwaves
- More violent storms, with heavy rainfall.

North West - Lichtenburg

1. Impact of Climate Variability on Yields:

Maize yields achieved in the latest season varied between 0.4 (lowest) to 5.5 t/ha (highest) Some farmers reported that their average was around 4t/ha. Sunflower yields are between 0.5 - 4 t/ha. Historically maize yields in the region have been increasing over the long term, but the annual yields vary depending on the conditions. The benefits of a high yielding season are often countered by the corresponding lower prices.

2. The Main Climate Risks that Impact on Crop Yield:

The main risks facing the farmers are mainly a) timing of onset of rainfall, which seems to be later, b) extreme events such as heavy rain and high winds, c) heat waves in Jan/Feb (recently in Dec 6; weeks)– mid season drought affect crops and livestock - purchase feed and d) an increase in veld fires.

3. The Relationship Between Climate Risk and the Profitability:

Frost in March/April/May leads to reduced yields. Late rainfall, cloudy and cool during summer causes diseases during pollination, and reduced sunshine day length affects yield. Too much rain – flooded fields, prevents activities such as spraying, weeding, planting, and this reduces yields if pests and diseases take hold. Excessive wind causes erosion of soils and may lead to lodging when seedlings are small.

4. Climate Risk Responses

Some adaptive and mitigation activities include shifting planting dates to avoid frost, applying conservation agriculture principles, training in firebreak planning and management, loans to purchase implements instead of hiring, to enable timeous harvesting.

Again, though rainfall records were only available until 2010, it was clear that in some years the total seasonal rainfall did not explain the low yield of, for example, the 2006/7 season, (see Figs 6, 7) where the yield was well below the average, while the summer rains were just on average. Some intra-seasonal analysis is required to see if a climate related factor was to blame.

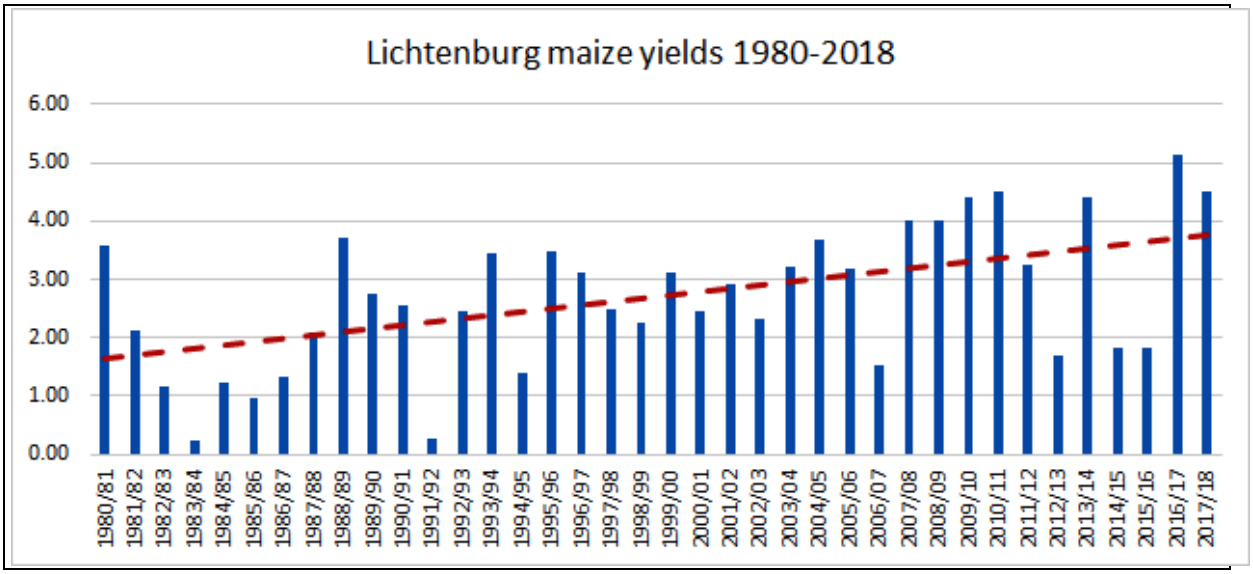

Figure 6: Lichtenburg historical maize yields

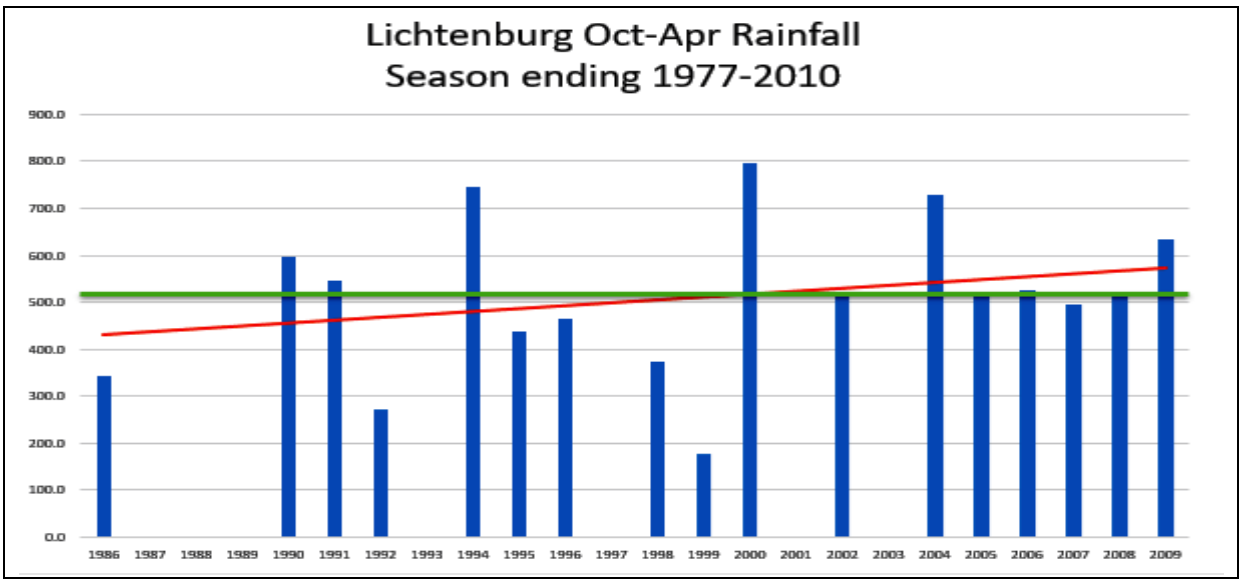

Figure 7: Lichtenburg historical summer rainfall

Comment: When interrogated about changing climate patterns, the following were mentioned by the farmers:

Rainfall:

- Onset is occurring later
- There is less rainfall, with rainfall shifting to the east
- 1st rains in August, (which is sooner than expected)
- *Kgogolammoko* is the rain that falls after the harvest season. It is reported that this is falling earlier before harvest is finished, now mid Sep/Oct
- Lighter rainfall generally
- More lightning

Temperature

- It is now hotter in October

- There is a bigger diurnal temperature range (<10) in summer, which is not good for maize
- Winters are becoming warmer (night and day)

Extremes

- The typical mid-season drought is extending
- Stormier weather apparent in late summer, with hail
- Hail coming later – worse for crop, as the seeds are more developed

Western Cape - Malmesbury

At a farmer meeting organised by the Development coordinator, a presentation was made regarding the project and some questions were discussed around the future of wheat in the region. Some salient points were:

- Recurring drought was a major threat to wheat yields.
- Input costs that included pesticides, fertiliser and herbicides were rising and reducing profitably
- Conservation agriculture with soil moisture preservation was a prerequisite for wheat farming today
- Better wheat cultivars are required to handle the drier conditions.