Promoting drought tolerant wheat varieties, Shandong Province, China

Source
FAO

Keywords
Plant, wheat drought

Country of first practice
China

ID and publishing year
7396 and 2011

Sustainable Development Goals
Zero hunger, decent work and economic growth and life on the land

Summary
This practice describes how water logging tolerant wheat varieties can mitigate the impact of water-logging and drought spells on wheat crops through the introduction of more hazard resilient varieties and innovative cultivation technologies. This practice aims to mitigate the impacts of drought spells on wheat crops through the introduction of more hazard resilient varieties and cultivation technologies.

Description
The introduction of new drought resistant wheat cultivars, as well as soil improvement practices constitutes an efficient way to enhance resilience of local farming systems to drought events. Wheat experts were invited to provide technical guidance on demonstration fields. Topics included disaster prevention and reduction cultivation techniques, such as delayed planting and Nitrogen fertilization, and reduced seeding rate. It is important to complement the introduction of new cultivars with training to provide farmers with management skills on soil improvement.

1. Introduce disaster-resilience crop varieties
The two wheat varieties, namely Jimai 21 and Jimai 22 (the latter created by SAAS, the Shandong Academy for Agricultural Sciences and approved in China in 2007) are labelled for their vigorous roots and resistance to drought and disease. They have strong tailoring ability, and many eras with strong stems. In general, these cultivars have high ratios of productive tillers and optimum ratio of yield components, as well as good resistance to powdery mildew and strip rust.

2. Cropping pattern
2.1 Wheat-cotton double cropping
1. Three lines of wheat were planted in a 1.5 m width area in early October with in-row spacing of 20 cm. The following year, another two lines of cotton were planted in late April or transplanted in mid-May along the side of wheat with in-row spacing of 50 cm. The row spacing between wheat and cotton is 30 cm.
2. Before planting, a 10 cm high ridge is built up. Wheat will be planted in the bottom, and cotton is planted on the ridge. Wheat can be easily watered and make full use of rainwater. It can improve the germination of cotton and alleviate the controversy between wheat and cotton. During rainy season in summer, rainwater can be drained out in time. The method
can increase air movement in the cotton field and prevent boll rotting, so the damage caused by water logging will be considerably reduced.

3. The optimum management procedures have been established based on the field trials on sowing time, seeding rate, irrigating, fertilizing, controlling of pests and diseases. The optimum planting temperature was between 16 and 18 °C. The optimum seeding rate was between 80 000 and 120 000 seeds per mu.

2.2 Disaster-relief measures

2.2.1 Irrigation
Wheat should be fully irrigated during the turn-green stage and winter. If it has not been watered in winter, lower soil moisture would prevent the growth of lateral root. Between 75 and 150 kg urea per hectare is necessary during irrigating if the wheat does not grow well. If the wheat has been watered well in winter, then soil should be loosened to retain moisture in early spring.

3. Technical training
A series of technical trainings were conducted, such as an in-door workshop, technical guidance in farmers’ fields and field demonstration. Farmers benefit from the knowledge on the characteristics and the cultivation technologies of the newly introduced cotton varieties.

3.1 In-door workshop
Before planting, experts on cotton from universities and research institutes were invited to a technical training in-door workshop on disaster prevention and reduction. The techniques of the local bureau were shared with agronomists, field-level technicians and farmer representatives, who also attended the training workshop. The workshop was based on lectures and informal discussions.

3.2 On-spot technical guidance
Cotton experts were invited to Juye to provide technical guidance on spot during the critical growing stage of cotton, such as planting, germination, seeding stage, squaring stage, boll-setting stage. Experts also go to the field to give farmers assistance and guidelines in case of disasters.

3.3 Field demonstration
Build high-standard demonstration fields using disaster prevention and reduction cultivation technologies in the project area. Farmers attended these field demonstrations to learn about the technologies. Farmers who attended technical training could skilfully apply the techniques in production practices.

4. Results and Impacts
In pre-tests of the new varieties, the yield of the Jimai 21 cultivar was 19 percent greater than that of Lumai 14 in advanced yield trials in 1999 and 2000. In 2000 to 2001, the yield of Jimai 21 was 5.2 percent greater than that of Lumai 14 (control crop), averaging 538.1 kg per mu. In the following season, the yield of Jimai 21 averaged 494.47 kg per mu, 6.1 percent greater than control in regional trials.

The yield of Jimai 22 averaged 530.94 kg per mu, the equivalent to 8.98 percent more than that of the Lumai 14 in regional trials during 2004. The following year, the yield averaged 542.68 kg per mu, 12.59 percent greater than control in regional trials. In the Huanghuai growth area, the yield of Jimai 22 averaged 517.06 kg per mu, that is, 5.03 percent greater than Shi 4185 in regional trials in 2005. The same year, the
yield of Jimai 22 averaged 542.68 kg per mu, equal to 4.05 percent greater than control in Shandong province. The highest yield of Jimai 22 was 727.43 kg per mu.

In 2009, a year with serious drought spells in early spring, the yield of wheat increased in the studied area when compared to the yield in 2008.

In a cost-benefit analysis carried out to evaluate the new cultivars, the results demonstrated that although more money (about 31 RMB/mu) is required to plant Jimai 21 and Jimai 22 than control, earnings equaled 51.4 RMB/mu in the case of Jimai 21 and 65.4 RMB/mu for Jimai 22.

5. Minimum requirements for the successful implementation of the practice
In order to introduce the new wheat varieties, training of farmers on high yield efficiency cultivation, with focus on techniques on planting, fertilization, plant density and harvesting as well as cultivation technologies to local communities is necessary.

6. Agro-ecological zones
• Tropics, warm
• Subtropics, warm/mod cool

7. Objectives fulfilled by the project
7.1 Pro-poor technology
Using improved wheat varieties helps poor farmers to enhance resilience of their farms and crops.