

Maize production in DPR Korea: Role of improved technologies

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Introduction

Maize is the second most important cereal crop of DPR Korea. It is grown mainly under rainfed conditions and is more universally distributed than paddy. DPRK is the only country to have adopted maize transplanting on a wide scale, a locally innovated technology to suit double cropping and the relatively short warm growing season. Maize transplanting was initiated at the end of 1960s. Since 1975 the practice was adopted by all maize growers as a routine and common practice for maize cultivation in DPR Korea. The crop is grown on average (2012-2020) 37.5 percent of the total farm cultivated area and contributes 39.2 percent to total production of food crops (in cereal equivalent). Maize cultivation is concentrated in the provinces of North Pyongan, South Hwanghae, North Hwanghae, South Pyongan, Kangwon, South Hamgyong, and North Hamgyong. It is also grown in smaller areas in upland Chagang and Ryanggang provinces.

Maize cultivation in DPRK

In DPR Korea, maize is cultivated in the main cropping season which typically starts in April with the arrival of spring rains and ends between September and October. Because of low temperatures prevailing at the beginning of the season, farmers grow seedlings in seedbeds equipped with protective cover for subsequent transplanting in the field which begins in May. Most cooperative farmers raise seedlings by sowing seeds in pots laid out in seedling beds. The standard practice for making the substrate for use in seedling pots is to mix humus and soil with chemical fertilizers and compost. One germinated seed is dropped into each pot. The seedbeds are immediately irrigated after seeding. The temperature and humidity of soil in seedbeds are observed and regulated. The seedbeds are covered with plastic films for major protection and the films are covered with straw mats for additional protection. Temperature and carbon dioxide concentration inside the protection is regulated by cyclic uncovering and covering.



Maize seedbed

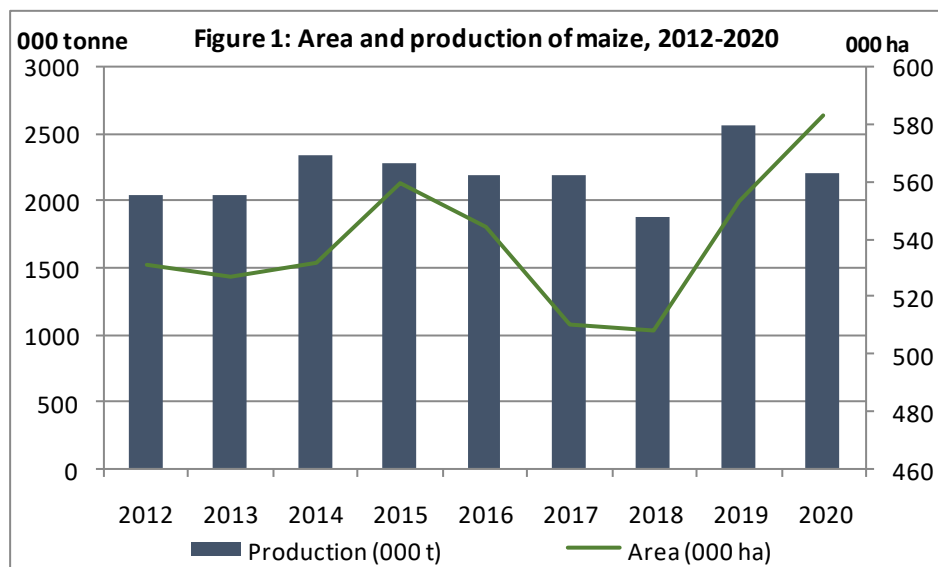
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Seedlings cultivated in protected seedbeds are normally transplanted at 2-3 leaf stage but transplanting at 4-leaf stage is more common practice among farmers in northern hilly areas where cropping season is shorter and farmers grow two crops, maize as first crop and autumn vegetable as second crop. Some cooperative farms have recently introduced surface coating cultivation and direct sowing of nutritive maize seeds with mulch cover which helps increasing weeding effectiveness and seed germination rate. Maize transplanting begins in mid-April and continues till the end of May. Harvesting starts in September and continues till October followed by threshing. Harvesting and threshing is completed in November.



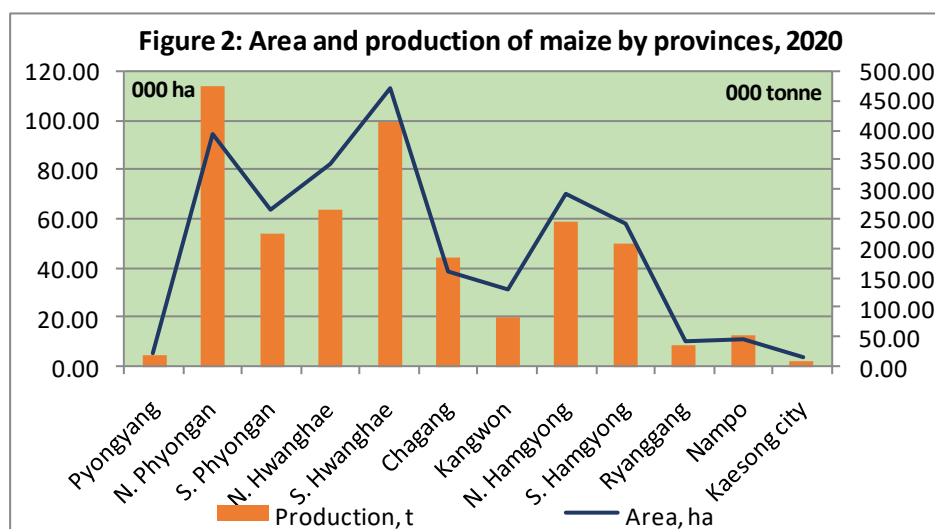
Maize crop at Laerim Cooperative farm, 25 July 2020

During the period 2012-2019, maize cropped area in DPRK increased from 531 000 ha in 2012 to 560 000 ha in 2015 followed by a steady decline till 2018 and a sharp increase to 554 000 ha in 2019. In 2020, maize cultivated area increased again to 583 262.60 ha by 5.3 percent from the level of 2019 (Figure 1).

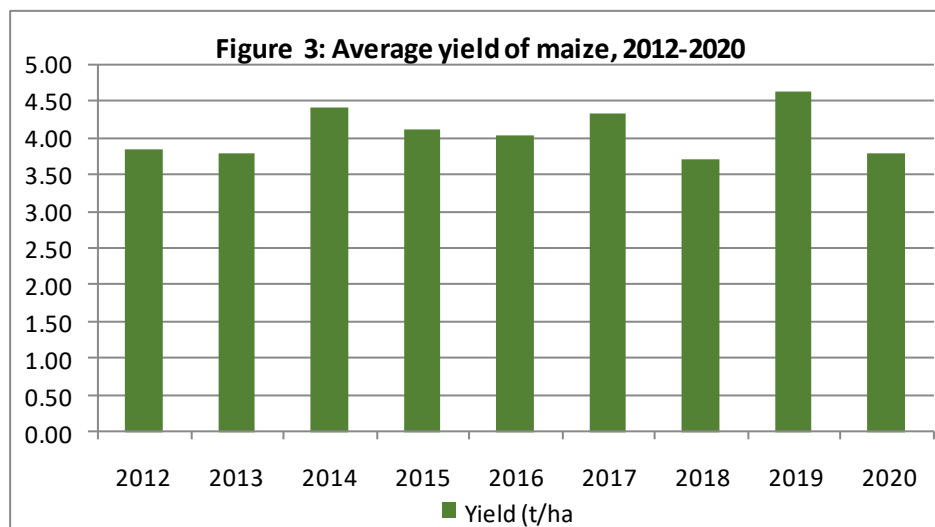


Production of maize ranged from 2.04 million tonnes in 2012 to 2.214 million tonnes in 2020 with the highest recorded at 2.57 million tonnes in 2019. Production steadily increased from 2012 to 2014; started declining since 2015 which continued till 2018 mainly owing to crop damages and losses caused by recurrent droughts and floods during this period. Maize yields increased from 3.84 tonnes/ha in 2012 to 4.42 tonnes/ha in 2014 followed by a decrease to 4.03 tonnes/ha in 2016. In 2017, despite the maize area decreased by 6.3 percent from the previous year's level due to drought, production exceeded by 0.2 percent which was reflected in a yield gain of 6.9 percent (4.31 percent) compared with the level of 2016 (Figure 3). The average maize yield in 2019 was 4.63 tonnes/ha, 30.5 percent above the lowest 2018 level and 9.8 percent above the average (2014-2017) level (Figure 3).

Average maize yield in 2020 was 3.796 tonnes/ha, below the 7-year (2012-2018) average yield (4.03 t/ha) by 5.7 percent. The decline in maize production and yield in 2020 was due to crop losses and damages affecting 42 524 ha of mostly paddy and maize fields caused by August 2020 flood. There were also significant crop damages due to a series of cyclones that occurred in the wake of flood. Of the total maize cropped area distributed by provinces in 2020, South Hwanghae accounted for the largest share (19.4 percent) followed by North Pyongan (16.3 percent), North Hwanghae (14.1 percent), North Hamgyong (12.0 percent), South Pyongan (11.0 percent), and South Hamgyong (9.9 percent) (Figure 2). The highest yield was recorded in North Pyongan (4.98 t/ha) followed by Chagang (4.69 t/ha), Nampo (4.58 t/ha) and Pyongyang (3.83 t/ha) (Figure 3).



The share of the provinces in 2020 maize output was 27.3 percent for North Pyongan; 23.9 percent for South Hwanghae; 14.8 for South Pyongan; 10.8 percent for South Hamgyong; 4.1 percent for North Hwanghae; 4.5 percent for North Hamgyong.



Maize production innovations and technologies

In North Pyongan province, several cooperative farms introduced efficient methods including round and pile cultivation. South Hwanghae Province increased utility rate of maize seed-coating materials, sowing seeds in large areas under maize crop. In North Hwanghae, cooperative farmers introduced surface coating cultivation and direct planting of nutritive seeds to increase germination and weeding effect in order to hasten maize planting².

The Maize Research Institute of the Academy of Agricultural Science (AAS) has bred the first-generation hybrids of a dozen high-yielding maize varieties that can be cultivated in various ecological areas, as well as the self-pollinated (inbred) lines of maize with good harvest component and high resistance to unfavourable conditions. Researchers bred the first-generation maize hybrids for the first time in the country by multiplying the self-pollinated line and, on that basis, developed new varieties.³ Besides, the institute has developed an extremely early variety which has a growing period of less than 130 days and is resistant to diseases, moisture damage and drought, and another variety which yields higher in the intermediate areas along the western coast of the country and is highly resistant to low temperature and moisture damage.

Conclusion

Food security in DPR Korea is largely determined by the two major cereals, rice and maize. Maize has the advantage of growing throughout the country because it is grown under rainfed conditions. The crop is

² Maize Planting Nearing Completion in DPRK, Rodong Sinmun 17 May 2020

³ Good strains of maize bred, Naenara News, 22 August, 2020

more tolerant to soil moisture stress and drought. DPRK researchers have bred improved varieties and developed maize crop management technologies to support growth in maize yields and production.