

The Stable Production of Organic Seed to Distribute Certified Seed of Waxy Corn Hybrid

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Key words: Organic seed production, Certified seed, Waxy corn hybrid, Seed yield

Abstract

In order to produce the organic foods in accord with international standard, organic seeds should be used in organic farming. This study was conducted to establish the stable production of organic seed of waxy corn by examining the growing characteristics, seed yield, and the economy for seed production by organic farming. The optimal sowing timing for organic seed production of waxy corn hybrid was within 10 days of the 1st of May with yield of 88~90% of conventional seed production. The optimal planting density was 41,600 plants/ha (80×30 cm) for organic seed production of waxy corn. The weight of 100 seeds and seed productivity increased at the planting ratio of 2:1 mother plant:male plant. Growth and seed production were improved by removing male plant at 7~10 days after silking. Organic fertilizer (mixed oil cake) was applied at a rate of 4~6 Mg/ha before sowing. Black plastic mulching was used for weed control. In addition, sex pheromone trap and bio-control agents were used for safe pest control and low labour cost.

Introduction

With regard to the certification of the organic food, the organic seed production should be followed the guideline of CAC (Codex Alimentarius Commission). However, conventionally produced seeds have been mostly used in organic farming and a few researches have been performed on the production technology for the organic seed of crops including waxy corn. Accordingly, the establishment of organic seed production system is necessary to promote the organic food production and organic seed industry. This study was conducted to systemize the organic seed production to distribute certified seed of waxy corn hybrid through organic farming.

Materials and methods

This study was performed in a field of Gangwondo Agricultural Research & Extension Services and a field in Nammyeon, Hongcheon from April 2008 to October 2010 for 3 years. The seed parent (mother plant) and pollen parent (male plant) of Miback 2 and Miheugchal were used. The planting density was 41,600 plants/ha (80×30 cm). Mother and male plant were planted at a ratio of 2:1. The organic fertilizer, oil cake, was used at a recommendation rate before sowing. In addition, livestock compost was sprayed at a rate of 20 Mg/ha.

Results

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The yield of organic seed was 1.9 Mg/ha for Miback 2 (Fig. 1) and 1.4 Mg/ha for Miheugchal (Fig. 2), corresponding to 88~90% of conventionally produced one.

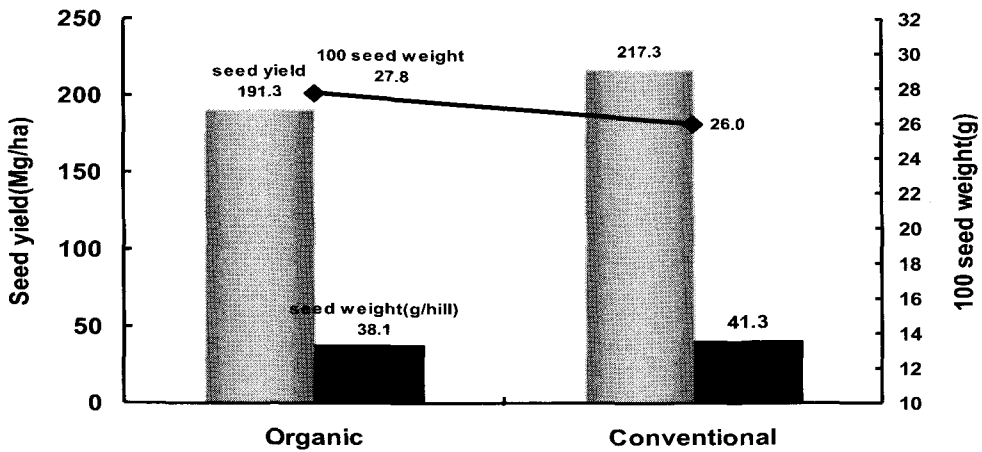


Figure 1: Seed yield and weight of 100 seeds for the organic seed production of Miback 2, a white waxy corn hybrid.

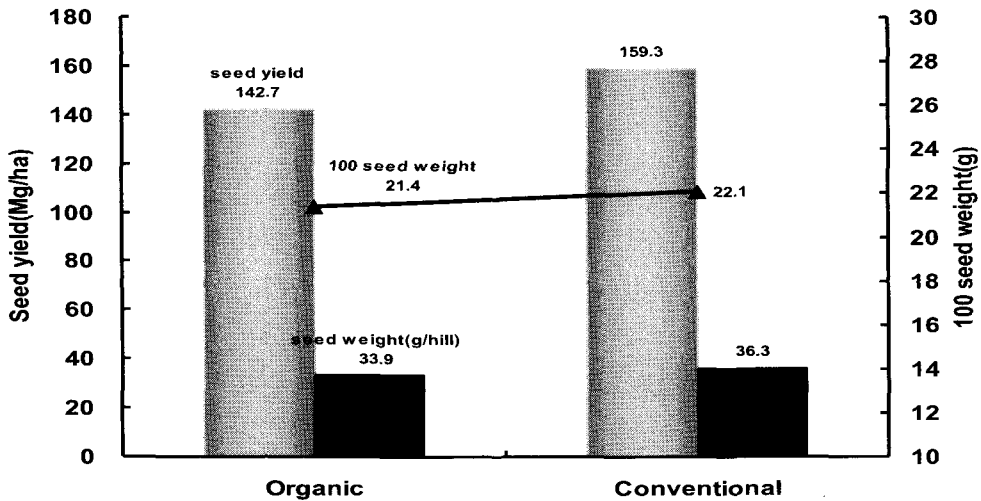


Figure 2: Seed yield and weight of 100 seeds for the organic seed production of Miheugchal, a black waxy corn hybrid.

The actual income of organic seed producing farm increased by 1,194 USD/ha compared with conventional one because of price differentiation although low seed production (Table 1).

Table 1: Economic analysis of the organic seed production of waxy corn hybrid

Loss (A)	Profit (B)
<p>© Increased cost : 1,854 USD/ha</p> <ul style="list-style-type: none"> - Cost for agrochemicals : 300 • 2 types of bio-control agents × 150 = 300 - Cost for fertilizer : 900 • 20 bags of organic fertilizer × 45 = 900 - Cost for plastic : 250 • 1 roll of mulching plastic × 250 = 250 - Cost for labour : 404 • Plastic mulching = 404 <p>Total (A) : 1,854 USD/ha</p>	<p>© Reduced cost : 1,462 USD/ha</p> <ul style="list-style-type: none"> - Cost for agrochemicals : 400 • 2 herbicides × 80 = 160 • 4 pesticides × 60 = 240 - Cost of fertilizers : 860 • 6 bags of fertilizers × 120 = 720 • 1 bag of side dressing × 140 = 140 - Cost for labour : 202 • Agrochemical spray = 101 • Side dressing spray = 101 <p>© Increased revenue : 1,586 USD/ha</p> <ul style="list-style-type: none"> - Increased income • Conventional : 217kg×130 = 28,210 • Organic : 191kg×156 = 29,796 <p>Total (B) : 3,048 USD/ha</p>
<p>© Estimated revenue (B-A) = 1,194 USD/ha</p>	

Discussion

The optimal sowing time for stable production of organic seed of waxy corn was within 10 days of the 1st of May. The seed productivity for the organic seed production was 1.5~1.8 Mg/ha, 88~90% of conventional one. However, the actual income of seed producing farm is expected to increase by 5% through high price of the organic seeds by about 20%. Consequently, the stable organic seed production can be attained through sowing at a proper time and price differentiation from conventionally produced seeds.

Acknowledgments

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References

- Kang J. H., Lee H. J., Park B. H. (1985): Growth analysis of silage corn in response to seeding time. *J. Korea Grassl. Science* 5(3):213-219.
- Choe Z. R., Joo Y. K., Song M. T., Oh H. S., Ann D. W. (1990): Determination of sowing date for silage corn based on growing degree days and soil temperature. *Korean J. Crop Science* 35(3):254-258.
- Ryu S. H., Min H. K., Cha S. W., Park K. J., Park J. Y., Huh N. K. (2003): Seed Production Method for Waxy Corn Hybrid, Chalok 2. *Korean J. Crop Science* 48(6):424-428.
- Cho J. Y., Kwon H. J., Kang Y. K., Jong S. K. (1983): Effect of plant density and planting date on growth and grain yield of maize hybrids. *Korean J. Crop Science* 28(2):227-232.
- Craig W. F. (1977): Production of hybrid corn seed. In G. F. Sprague(ed.) *Corn and corn improvement*. 2nd ed. *Agronomy* 18. 671-719.
- Kim J. S., Goh B. D., Gwang J. G., Lee M. C., Kim C. Y., Kim J. K., Shim C. K. (2010): Occurrence of disease and insects in organic waxy corn seed production area. *Korean J. Organic Agriculture* 18(1):93-104.