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Soil Storage Seed Bank Longevity Prediction by Seeding Period

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[Introduction]

Cultivation of LMO crops is increasing worldwide. LMO crops are cultivated and distributed overseas, which causes a problem of unintentional release. In Japan and Canada, unintentional release of genetically modified canola near grain transport ports and transport routes has been reported. As the number of imports of domestic LMO crops increases, the cases of unintentional release are occurring. There was a problem with the unintentional release of genetically modified canola in Korea. In addition, cases of unintentional release are increasing with the discovery of genetically modified corn near the Incheon Port. A management manual is needed to prevent unintentional release. Therefore, this a study was conducted to predict the longevity of unintentionally released seeds.

[Materials and Methods]

The seeds were planted in the soil in spring and fall in three different regions of Korea: northern (Namyangju), central (Cheongju), and southern (Jeju). Canola, alfalfa, cabbage, and cotton seeds were sampled at intervals of one month after soil storage at a depth of about 5-7 cm to predict the longevity of ungerminated seeds. For the sampled soil-stored ungerminated seeds, germination experiments were performed using the ISTA (International Seed Testing Association) manual. Germination conditions were tested in a chamber at 20 °C (light/dark, 16h/8h) for canola seed, and at 25 °C (light/dark, 16h/8h) for other seeds.

[Results and Discussion]

The results of longevity expectancy analysis of seeds are as follows. The average number of days required to reduce the longevity of soil stored canola by 0.1% was 57 days in spring soil storage and 774 days in fall soil storage. Alfalfa seeds were predicted to have an average of 34 days in spring and 37 days in fall. Also, it was showed that cabbage seeds would take an average of 57 days in spring and 572 days in fall. And cotton seeds were expected as 42 days in spring and 57 days in fall. It suggested that the longevity of the buried seeds in fall was longer than that of buried seeds in spring. These results suggest that ungerminated seeds remain dormant due to the low temperature in winter, and their vitality remains. Therefore, it indicates that the monitoring period is longer if the seeds are unintentionally released during sowing or harvesting in the fall than the unintentionally released seeds during sowing in spring. If the LMO seeds are unintentionally released, it is considered that continuous and in-depth monitoring and treatment for loss of vitality of the seeds should be carried out together.

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