

Management of Seed Orchards considering Gain and Diversity and how it is Applied in Korea

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Genetic gain and diversity, expressed by status number, of seed crops from a Korean seed orchard were estimated considering selection, fertility and pollen contamination, and compared for different management alternatives (selective harvest, genetic thinning, and combination). Management variables included the proportion of clones left after selective harvest and/or genetic thinning. The impact on genetic gain and diversity of seed crops was quantified as a function of the quantity and quality of gene flow from outside the seed orchard.

Selective seed harvest, genetic thinning (50% and 75%) and combination of both options increased genetic gain over the initial orchard condition. The increase was, however, coupled with a decrease in status number. Genetic gain was highest and diversity (status number) lowest in the alternative with 75% thinning intensity under both gene migration scenarios.

Pollen contamination affected both genetic gain and diversity. With no pollen contamination, all alternatives showed higher genetic value but lower status number, compared to the scenario with pollen contamination. Before thinning (selective harvest), a gene migration rate of 15% increased the status number by 22.2%, but after genetic thinning, regardless of intensity, the same level of gene migration raised the status number by 27.8%.

Relative gain from orchard management varied with the proportion of selected and/or thinned clones. The increase in genetic value was not linear relative to the proportion of selected and/or thinned clones in selective harvest and genetic thinning options. Genetic thinning gave greater gain than selective harvest at the same intensity, but this was accompanied by a greater loss of status number.

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