

MARKER Assisted Backcross in maize, cereals and vegetables

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Introduction

Scientists from industry, academia, and the public sector are focusing on the applications of DNA markers. As applications for molecular markers continue to expand, many scientists are using companies like Celera AgGen to produce their marker data. They have discovered that using the services of a specialized company is often the most cost effective and easiest means of obtaining the marker information required to meet their research objectives.

Application

Plant breeders are utilizing molecular markers extensively to increase the efficiency of their backcross breeding programs. Utilizing molecular markers reduces the number of backcross generations and the time required to recover a very high level of similarity to the recurrent parent, and insures that no large, unwanted segments of donor parent genome remain intact. Marker-assisted backcross breeding has proven especially effective for incorporating single genes, such as transgenes, into commercially desirable lines and varieties.

Celera AgGen/Agrogene provides marker-assisted backcross (MAB) services to plant breeders around the world, using microsatellite and/or AFLP markers. Currently, b optimized mapped SSR marker sets are available in most crops including maize, wheat, oilseed rape, barley, tomato, pepper, melon, grapes for most breeding applications.

Table 1: Example of results obtained with MAB in Maize

Generation	Project 1	Project 2	Project 3	Project 4	Project 5
BC1	11.11 to 21 % (82 M.)	12,7-17,5 % (138 M.)	10,6-15,2 % (65 M.)	12,8-21 % (57 M.)	14,-23 % (38 M.)
BC2			9,4-27,03 % (37 M.)	3,7-3,9 % (83 M.)	3,9-7,6 % (84 M.)
BC3				Recombinant	Recombinant

The information required to undertake a MAB project for a customer includes the crop and the number of backcross progeny to be evaluated, whether initial selection of the progeny for the trait of interest is being done phenotypically or with a DNA marker, and the choice of technology to use for identifying those progeny most similar to the recurrent parent. AGGEN/AGROGENE uses AFLP, and SSR (microsatellite) technology for marker-assisted backcrossing, and the choice of technology depends upon the crop and other specifics of the project.

The Celera AgGen/Agrogene service representatives work with the breeders to determine the optimal number of progeny to use in the backcross program, and to identify the technology that is most suitable for the project. The customer service representative also arranges to obtain a sample of the recurrent and donor parents so that a parental screen can be completed and informative markers can be identified prior to receiving the backcross progeny.

Most MAB projects require 3- weeks from the time samples are received until the data is delivered to the breeder. Data

reported to the breeder include the similarity of each progeny to the recurrent parent, and the genotypes of every backcross progeny. AGGEN/AGROGENE provides both written and electronic reports, and can deliver data electronically to the breeder for immediate use in the nursery.

By using Celera AgGen/Agrogene' MAB services, many plant breeders are completely recovering the recurrent parent genotype in two backcross generations. The ability to identify the backcross progeny that are most similar to the recurrent parent provides the breeders with the ability to move from directly from the backcross breeding program to commercial production of the recovered variety or hybrid. Celera AgGen/Agrogene' experience with all molecular marker technologies and marker-assisted backcross make it easy for the breeder to utilize DNA markers for this application.

In addition to marker-assisted backcross services, AGGEN/AGROGENE provides breeders and geneticists around the world with trait mapping, marker-assisted selection, GMO detection and fingerprinting services.

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