



Joaquima Messeguer, IRTA, Spain

Coexistence of GM Bt maize in Spain: gene flow evaluation

Dr. Joaquina Messeguer

Institut de Recerca i Tecnologia Agroalimentaries (IRTA)
Departament de Genètica Vegetal
Centre de Cabriels s/n
08348 Cabriels (Barcelona)
Spain

The European Corn Borer (*Ostrinia nubilalis*) and the Mediterranean Corn Borer (*Sesamia nonagroides*), cause severe losses in Spanish maize production, where up to three generations occur. The larva penetrates the stalk and excavates a large tunnel that results in the decrease of water and nutrients circulation to the plant and the ear. These larvae are difficult to control with chemical insecticides because they are vulnerable for only a short time before they bore into the plant or the cob. In consequence, genetic engineered *Bt* maize varieties, especially designed to control these pests, have the potential to improve the control of corn borers, compared with current practices.

On 1998 two *Bt* maize varieties were approved for commercialization, but only one of them, (Compa CB (Bt 176) from Syngenta Seeds) has been sold effectively. During 1998-2002 *Bt* maize adoption in Spain stagnated at about 25 000 ha because Syngenta's voluntary arrangement. In 2003 and 2004 the adoption of *Bt* maize had increased to 32 000 and 58 000 ha respectively, due to the fact that new varieties developed by Syngenta, Pioneer, Monsanto, Nickerson and Limagrain were approved by the Ministry of Agriculture. Several studies published recently have pointed out that till now, there has not been detected any significant problems related with the coexistence with conventional or organic crops. Nevertheless, according to the EU Legislation, an official regulation on coexistence based on reliable data, has to be established in all countries from EU, and so, several field studies have been performed recently in Spain, mainly focused to the evaluation of pollen-mediated gene flow in our particular conditions.

A field study was conducted by our Institute at Lleida (Catalunya). A 50 x 50 plot of *Bt* maize Compa CB was planted in the middle of a field and surrounded by the conventional variety Brasco. The total area of the trial was 7.5 Ha. Speed and wind directions were recorded during the flowering period. By analyzing by real time PCR technique the 250 samples collected, it was found that the level of GM adventitious presence decreased rapidly with distance from the GM emitter crop. Wind direction strongly influences the rate of GM adventitious presence. Thus, in the direction of the prevalent wind, the rate of GM in the non- GM crop was already less than 0.9% at a distance of 10 m whereas in that located upwind direction, the rate of GM was less than 0.9% at a distance of 2 m from the GM emitter crop. These results agree with those obtained in other field trials conducted during the same year.

Nevertheless, it were detected some "hot spots" (areas of GM adventitious presence that could not be explained by the effect of prevalent winds). Moreover, the size of *Bt* maize plot used in this field trial was too small to properly predict what will happens with larger fields such as those commonly planted in the south of Spain.

So, another field trial was conducted on 2004. In this case, four *Bt* maize varieties (with yellow colored grain) were planted in such a way that each one of them occupied different area. *Bt* varieties were surrounded by a non-transgenic one (white grain). Total area of transgenic varieties was of 4 Ha whereas the total area of the field was of 27 Ha. In this trial a visual identification of yellow grains placed in the cobs of the white variety will allow us to evaluate the gene flow very accurately along the whole field. By analyzing these grains it will be possible to identify from what variety GM pollen comes from and to estimate the influence of the size of the field in cross pollination. This research is still in progress.

Another question that has to be taken into account, is what can happens when, GM, conventional and organic fields coexists in the same area; this is in a real situation of coexistence such as we have in Spain. In this sense a research program has been recently started in the frame of SIGMEA project. Data obtained in this research will be used to validate the gene flow simulation models and will contribute to design and implement an operational, practical and dynamic generic gene flow modeling platform a the landscape level.



Joaquima Messeguer, IRTA, Spain

Coexistence of GM Bt maize in Spain: gene flow evaluation

Joaquima Messeguer is a researcher at Plant Genetics Department.

She is a specialist on plant tissue culture technics. Her main competences deals with plant genetic transformation (mainly in rice) and risk assessment of pollen mediated gene flow in rice and maize.