

## USE OF GENETICALLY MODIFIED CROPS: THE POTENTIAL WIDER IMPACT ON FARM LAND

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In conventional agriculture, herbicide application is standard practice. All crops are tolerant to herbicide to some extent. Selective herbicides are usually only effective against particular types of plants. For example, some herbicides may kill grasses but not broad leaved weeds, which allow them to be used in crops such as oilseed rape. Other types of herbicides may kill broad leaved weeds but not grasses, allowing their use in cereal crops. Herbicide tolerance develops in certain species by natural selection in response to herbicide use, for example blackgrass has developed resistance to some herbicides in some areas.

**Case study: GM herbicide tolerant crops:** Within any field crops, the farmer's objective is to minimize the number of weeds and pests which occur to gain an optimum crop yield, and to produce quality products with the minimum of contamination. Decisions on whether or not to control pests diseases or weeds are based on economic thresholds, and can be assisted by pest forecasting and expert advice. Climatic conditions play key role in decision making, and farmers have to make decisions in advance at crucial stages of crop development. The ability to harvest the crop effectively also needs to be considered; weed choked crops may make harvesting difficult and the crop may fail to meet minimum crop hygiene standards.

Herbicide tolerance in crops has been achieved through techniques other than genetic modification, for example mutagenesis. Genetic modifications enable the insertion of genes which de-activate herbicide when it is applied to the crop. Herbicide tolerance can also be achieved by inserting genes which replace an important enzyme in the crop which is susceptible to the herbicide with a non-susceptible enzyme with the same metabolic function. This allows the crop to grow and function normally without being susceptible to herbicide applications. The GM herbicide tolerant crops which have been developed for use in UK to date are tolerant to the broad-spectrum herbicides glufosinate ammonium and glyphosate, which kill most, types of plants, where as non-GM crops are tolerant to particular herbicides.

The regulatory regimes for controlling GM herbicide tolerant crops and the herbicides which may be applied

to them have been described according to government claims. The approval of herbicide would be under separate pesticide legislation and the decision on whether to grant approval would be based on:

- Environment safety of that particular use of herbicide and the products which arise through its degradation (metabolites).
- Metabolites to operators of applying the herbicide and safety of the residues of the herbicide and its metabolites to consumers;
- Herbicide resistance management strategies.

The use of approved herbicide is subject to specific conditions which restrict doses, application frequencies, timing and the use on particular crops or varieties. There are therefore legal requirements which are stipulated on the labels found on containers of herbicides to make any restrictions of use clear to the users. The overuse of herbicide which would result in damage to hedgerows, field margins, headlands and water courses, and a level of weed control beyond that necessary for optimum crop yield, can therefore be minimized through the existing legislation. This legislation is enforced by HSE agricultural inspectors who have set up an incident investigation scheme. All users of pesticide are subject to the pesticides legislation and are subject to prosecution if convicted of misusing them. It is illegal to spray margins and hedgerows with herbicides approved only for use on crops, and farmers must take precautions to prevent these habitat types being damaged when spraying crops.

**Potential advantages of GM herbicide tolerant crops:**

- The use of broad spectrum contact and systematic herbicides may reduce the need for cultivation which is used to encourage germination of weeds to incorporate persistent soil acting herbicides into the soil.
- Reducing cultivation will help conserve soil micro fauna and flora and reduce soil erosion.
- Broad spectrum herbicides such as glyphosate and glufosinate ammonium can be applied after weeds have emerged and remain active for relatively short periods of time. The products may replace persistent soil active herbicides such as atrazine, which is used in maize and is applied on a routine basis to the soil before

crop is sown, and before any weeds emerge.

– At present, we do not know if GM herbicide tolerant crops used in conjunction with particular herbicides will lead to more or less herbicide use. A reduction in herbicide use rather than an increase is possible. Currently, farmers use a sequence of applications of different herbicides to control competition of weeds with crops. Some of these herbicides can only be applied before emergence of weeds and are therefore routinely applied as precaution. GM crops allow the use of herbicides with a wider spectrum of activity which could be applied after the weeds emerge and which can be targeted at the correct growth stage to give the most effective control. Application dosages could be set at concentrations of herbicides which give effective control, but not total elimination. Some broad-leaved weeds are currently treated in cereal crops because they are difficult to control in following broad-leaved crops in rotation. Therefore, GM herbicide tolerant crops potentially offer greater flexibility and simpler programmes of sprays.

#### Potential dis-advantages of GM herbicide tolerant crops:

- The potential disadvantage of GM herbicide

tolerant potential problems with the management of herbicide tolerant crops, whether they are genetically modified or conventionally bred.

– GM herbicide tolerant crop requires proper record maintenance. It includes cultivation distance between GM crop and other crop to avoid contamination and maintenance of seed spillage.

– At present we are unable to predict the effect of GM herbicide tolerant crops to wildlife, as the wildlife plays major role in our farmland culture.

GM crops will be grown under regimes which reflect commercial scale and management at a number of representative sites and rotations. The studies on the effects of farmland wildlife will continue throughout the complete agricultural rotations in which the crops are grown. These studies will be overseen by an independently chaired committee for final evaluation. Though GM crops are having benefits for farmers, but one should clear about utilization of GM crops for regular cultivation. GM crops should become *BOON* for us, but it must not become *CURSE* as they are having disadvantages for human being also after consumption but they may not be identified up till.



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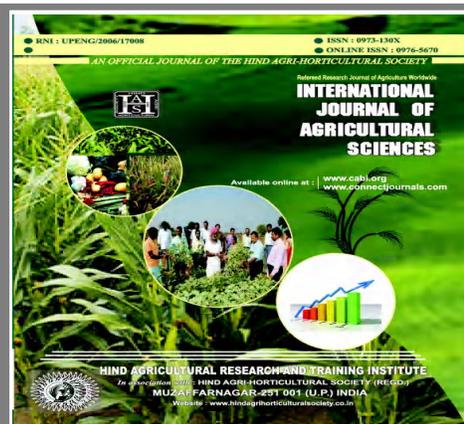
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