Herbicides are used routinely in agricultural production and their effectiveness is often determined by their ability to kill weed growth in crop fields and the tolerance of the main crop to the herbicide. If the main crop is not tolerant to the herbicide, the herbicide will either diminish the productivity of the main crop or kill it. If the herbicide is not strong enough, it may allow too much weed growth in the crop field which will lessen the productivity of the main crop. Therefore, it is desirable to produce economically important plants which are tolerant to herbicides. Crop selectivity to specific herbicides can be conferred only by use of genetic engineering and by introducing the genes into crops, which encode appropriate herbicide metabolizing enzymes.

Recombinant DNA technology has provided a new opportunity for engineering valuable traits in plants. Basically, foreign genes can be introduced into plants to alter metabolic pathways and to generate new products of plant metabolic engineering which includes also herbicide tolerant plants. Many crop plants are transgenic, comprising recombinant DNA that confers herbicide and/or pest resistance traits. For conferring crop improvement traits in crop plants is necessary to incorporate the additional recombinant DNA constructs of increased complexity. In some cases, engineering of new traits was made possible by the expression or suppression of a single gene while in other cases the expression or suppression of multiple genes during seed development was required.

Herbicide resistance strategies are variable, available and the transgenic plants have been engineered to express a variety of herbicide tolerance/metabolizing genes, from a variety of organisms. For example, acetohydroxy acid synthase has been introduced into a variety of plants, which make plants that express this enzyme resistant to multiple types of herbicides. There are other genes that confer tolerance to herbicides, such as: a gene encoding a chimeric protein of rat cytochrome P4507A1 and yeast NADPH-cytochromeP450 oxidoreductase, genes for glutathione reductase and superoxide dismutase and genes for various phosphotransferases.

Genes encoding enzymes which inactivate herbicides and other xenophobic compounds have been isolated from a variety of procaryotic and eucaryotic organisms. In some cases, the enzymes and the nucleic acids that encode them have the origin in a plant. In other cases, they are derived from other organisms, such as microbes and in other cases, these genes have been genetically engineered for successful expression in plants.
The transgenic plants have been developed which are tolerant to the herbicides, such as, 2,4-dichlorophenoxyacetic acid, bromoxynil (trade name Buctril), phosphinothricin (trade name Basta) and glyphosate (trade name Round-Up). Glyphosate kills both broadleaf and grass-type plants and is the top selling herbicide in the world. The resistance level of the transgenic plants to the glyphosate is due to the introduction of a modified Agrobacterium CP4 5-enolpyruvylshikimate-3-phosphate synthase (EPSP synthase or EPSPS) gene. Also, were obtained plants tolerant to benzoic acid herbicides, including dicamba, which can be produced by incorporating into the plants a 1-aminocyclopropane-1-carboxylic acid (ACC) synthase anti sense gene, an ACC oxidase anti sense gene, an ACC deaminase gene, or combinations thereof. The herbicide dicamba (trade name Banvel) is in the class of benzoic acid herbicides, is chemically stable and can sometimes be persistent in the environment and it used as a pre-emergent and post-emergent herbicide for the control of annual and perennial broadleaf weeds and several grassy weeds. Bacteria that metabolize dicamba are known and the specific genes responsible for a dicamba metabolism by these bacteria could be isolated and used to produce dicamba-resistant plants and other organisms.

These presented above, represent the result of the study made for more then 70 documents about the herbicide tolerant and resistant transgenic plants, identified in the patent literature.