



## Approaches for Natural Safeners for Controlling the Weeds

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### DESCRIPTION

Herbicides can efficiently control the weeds by safeguarding the production of food crops and to increase crop yields. By reducing human and material costs herbicides also bring enormous economic benefits to society. However herbicides cause herbicide injuries. Improper use of herbicides can affect the agricultural production and even cause crop failure. Herbicide safeners can be used to effectively solve the problem of herbicide injuries. About 30% of herbicide preparations on global market contain safe ingredients. Herbicide safeners selectively protect crops against herbicide injuries by without affecting the herbicidal activities of the herbicides against the target weeds and thus they enhance the safety and expand the application scope of herbicides. Since the first commercial safener was 1, 8-Naphthalic Anhydride (NA) was discovered by Hoffman which is to protect maize from injury caused by herbicide thiocarbamate in 1971. There are over twenty commercial safeners was developed such as dichlormid, fencloim, fenclorazoleethyl and flurazole. However, commercial safeners may be unsafe because they are usually used as inert active ingredients in the formulation of herbicide preparations and do not need to go through the pre-market registration process and the toxicology test for pesticide registration in most of the countries. As a result the environmental behaviours and potential environmental risks may be unknown. However, studies have shown that some commercial safeners pose potential environmental threats. Benoxacor is highly toxic to aquatic organisms such as aquatic autotrophic freshwater algae and zebrafish embryos. Dichloroacetamide safeners also produce medium toxicity in rats. Therefore, it is necessary to identify the novel eco-friendly safeners.

Natural safeners are chloroacetanilide, chloroacetanilide herbicides such as alachlor, acetochlor, butachlor, metolachlo, and S-metolachlor, which are one of the most popular herbicides in the world market which may cause significant phototoxicity and reduce the yields to crop plants such as rice, maize, proso millet

and sorghum. Most reported natural safeners are chloroacetanilide herbicides. In 1988, wilkinson found that the application of exogenous GA3 to soybean seedlings reversed the adverse effects produced by metolachlor. It is first recorded case of chloroacetanilide herbicide as natural safener. GA3 also show protection efficacy on maize against MET injury by indicating one natural safener which can relieve the herbicide injury caused by the same herbicide to different crops. With the exception of GA3 there are also several reported natural safeners are used for the rice. It is difficult to compare the safening activities between the experimental concentrations of herbicides and safeners sets in the references were not the same.

### Natural safeners for sulfonylurea herbicides

Sulfonyl urea herbicides also occupy an important position in the global herbicide market. Ethametsulfuron-Methyl (EM) is a type of sulfonyl urea herbicide for the controlling post emergence weed in oilseed grape. The great damage induced by EM in crop plants such as rice and maize which are limited its further application. Experimental results under laboratory field conditions indicated that applying BR can protect both rice and maize from the phototoxicity which is induced by ethametsulfuron-Methyl by the seed soaking treatment strategy. BR can also eliminate the phytotoxicity of sulfonylurea formulation causes injury to maize and soybean. They can reduce the herbicide injury of crop maize up to 82%.

### CONCLUSION

Recent studies show one natural safener which can alleviate the herbicide injury caused by different herbicides to same crop. Chloroacetanilide herbicides treated with rice can also reduce the photo toxicity caused by arylpicolinate herbicide halauxifen-Methyl (HM) to rice. As a potential safener low dose can reduce the herbicide injury caused by bentazone by 30% and increase sweet potato yield compared with the blank control. Studies on the detoxification effects of the same natural safeners on different herbicides in the same crop are still lacking and more related research should be carried out.

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