

## **New natural-like agrochemicals and fungicides for agrofood application**

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The new chemistry has a key role to play in maintaining and improving the quality of life, such as protection of the environment and development of sustainable synthetic techniques to solve environmental problems and to produce compounds selective and active at low concentration, with decreasing toxicity and side effects to humans, animals and vegetation. Chemical challenger includes the discovery and development of new synthetic pathway using alternative and sustainable reaction conditions.

According to that, two methodological approaches have been described for an application in agricultural practices.

The first is an example of Integrated Crop Management (ICM) strategy which involves the control of invasive insects by enhancement of the effects of plant secondary metabolism activated by natural volatile elicitors in the presence of piperonyl butoxide, a synthetic synergist. Effectiveness of elicitor has been enhanced by complexation with beta-cyclodextrin, a natural no toxic and environmental friendly cycloheptaamilose.

In field trials, co-application of synergist and beta-cyclodextrin-elicitor complex, carried out in tomato plants, have showed an effectiveness comparable to the same treatment performed with imidacloprid, a commercial neonicotinoid.

Synergistic manipulations of plant and insect defences. Georgina Bingham, Selcan Alptekin, Giovanna Delogu, Oktay Gurkan and Graham Moores. *Pest. Sci.* **2014**, 2014, 70, 566-571.

The second example involves a new method to face resistance mechanism of pathogenic fungi and their production of mycotoxins. Application of fungicides is the most common control method to overcome disease from *Fusarium spp.* in cereals. Prolonged use of different fungicides sharing the same mode of action induces a selective pressure on the pathogenic fungal populations, enabling the selection of resistance. New natural and natural-like phenolic inhibitors have been selected and prepared. They are able to counteract the pathogenic and mycotoxigenic potential of natural populations of *Fusarium* (resistance activation), rather than on their saprophytic phase. Some of them are effective fungicides in *Fusarium spp.* infections of human cells.

Natural and natural-like phenolic inhibitors of type B trichothecene *in vitro* production by the wheat (*Triticum sp.*) pathogen *Fusarium culmorum*. Pani, G; Scherm, B.; Azara, E.; Balmas, V.; Jahanshiri, Z.; Carta, P.; Fabbri, D.; Dettori, M.A.; Fadda, A.; Dessì, A.; Dallochio, R.; Migheli, Q.; Delogu, G. *J. Agric. Food Chem.* **2014**, 62, 4969-4978.