Editorial
Weeding with allelochemicals and allelopathy – a commentary

Plant breeders have generated many crop varieties that resist insects and pathogens through improved arsenals of bioactive natural compounds. More recently, molecular biologists have produced highly successful virus- and insect-resistant crops by introduction of transgenes that ultimately protect crops by means of natural polypeptides. Herbicides have been the largest segment of the pesticide market perhaps, at least in part, due to the lack of crops made resistant to weeds by breeding or transgenic methods other than herbicide resistance traits. Yet we know that some plant species produce potent phytotoxins that provide an advantage in nature against competing plant species. In most cases, this phenomenon is termed allelopathy, although some use this term for a broader range of chemical ecology processes.

Part of the lack of progress in the utilization of allelopathy as an agricultural tool against weeds may be due to its historical baggage. Allelopathy research has not enjoyed a sterling reputation, at least partly because of the scientifically weak nature of much of the published research. This problem was compounded after a prominent ecologist dismissed allelopathy as largely irrelevant about 30 years ago.[1] Thus, funding for allelopathy research was for several decades quite scarce, causing most of the better scientists to graze other scientific fields or to only dabble in allelopathy as a secondary pursuit. The situation has improved during the past decade, with more rigorous scientists over the world working in this area with more sophisticated experimental strategies and new, powerful techniques and instrumentation.

This issue of *Pest Management Science* contains two reviews that update us on recent progress on the potential for allelopathy for weed management. One review is by perhaps the most prolific and successful laboratory in the world that studies the chemistry of allelopathy.[2] This group's many discoveries have important biological, ecological, and agricultural implications. The other is from one of the brightest young minds in the area of allelopathy.[3] She emphasizes the dynamics and important interactions of allelopathy that must be understood to fully exploit it for agriculture. The two reviews cover most of the important results in the area of potential uses of allelopathy in agriculture from the past decade. Taken together, they highlight the importance of taking a multifaceted, interdisciplinary approach to understanding and exploiting allelopathy.

From these reviews it is clear that we have a much better understanding of what allelochemicals are produced by most of the important crops and that we are making progress in determining what genes control their synthesis. Still, much more needs to be done.

Harnessing allelopathy for weed management could have the greatest impact on synthetic pesticide use of any new technology. Considering this, allelopathy should not be relegated to a minor role in the fields of chemical ecology and pest management. To my knowledge, there is no research in this area in the private sector, other than that by one European seed company. Thus, real progress will most likely come from the public sector.

In Europe, this realization has helped to provide the impetus for FATEALLCHEM, an EU project involving several European laboratories,[4] including that of Macías *et al*. The International Allelopathy Society (www-ias.uca.es), organized by Professor Macías in 1996, provides a focal point for the growing number of scientists in this research area. If the progress over the past decade summarized in these papers can be exploited by plant breeders and molecular biologists over the next decade, we can hope for new crop varieties in the future that can reduce our dependency on synthetic herbicides.

REFERENCES

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