



Plant origin herbicides: chemistry, mode of action and weed management

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Abstract : Plant origin herbicides or allelomones are major source of natural herbicides to combat the weed problem in current organic and sustainable agriculture. Some of the secondary metabolites extracted from plant origin provide lead molecules *viz.*, 1, 8-cineole, leptospermon, artemisinin, sorgoleone and benzoquinones act as templates or analogs to produce new synthetic chemical herbicides. Various plant products had sufficient quantities of allelomones that affect the growth and development of weeds directly, however, these effects are concentration dependent. Herbicidal activity of plant aqueous extracts of sorghum, rice, maize, sunflower, eucalyptus and some of the medicinal plants and other plants were explained to control the weeds in different situations. Combined applications of these plant origin aqueous water extracts with reduced rates of synthetic herbicides could be an economic and effective weed management practices in organic and sustainable agriculture to minimize the herbicide load in soil.

Key Words : Plant origin herbicides, Chemistry, Weed management

View Point Article : Subramanyam, D., Srinivasulu, D., Sumathi, V. and Sajitha, K. (2013). Plant origin herbicides: chemistry, mode of action and weed management. *Internat. J. agric. Sci.*, **9**(1): 413-422.

Article History : Received : 11.08.2012; Accepted : 19.11.2012

INTRODUCTION

Herbicides continue to be a key component in most of the integrated weed management systems. Extensive and continuous use of synthetic herbicides could lead to serious threats to both environment and public health. Usage of synthetic herbicides is becoming more restrictive due to various problems *viz.*, residual toxicity, reduction in the choice of succeeding crops, development of herbicide resistant weeds and source for carcinogenic and mutagenic effects on human beings and animals (Rial-otero *et al.*, 2005). However, herbicide industry continuously searching for more effective, economical and environmentally safer herbicide formulations. The need for current sustainable and organic agricultural production system has also generated demand for effective and alternate plant based natural herbicides to combat the weed problem from the natural product data base. Duke *et al.* (1997) suggested four approaches for identifying synthetic organic herbicides *i.e.* screening of large number of synthetic

organic molecules, synthesizing analog of patent herbicides that do not fall within the boundaries of the existing patent, designing of new herbicide molecule based on molecular target site *i.e.* bio rational approach and screening of natural products for herbicidal activity.

There is great incentive to discover biologically potent natural products from higher plants that are as good as or better than synthetic agrochemicals. The potential wealth of natural plant based chemicals was relatively untapped and chemical structures were not identified. Phytotoxicity of plant products could lead to find out new herbicide molecules and to plan environmental friendly weed management strategies. The use of natural products for weed control has become increasingly popular, particularly in organic and sustainable agricultural systems. As the demand increases for cultivation of crops under sustainable agriculture and organic farming lead to less usage of synthetic chemical herbicides and attention is focused on reducing reliance upon synthetic herbicides and find out natural ways of weed management.

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