Journal of Agricultural Science; Vol. 4, No. 9; 2012
ISSN 1916-9752 E-ISSN 1916-9760
Published by Canadian Center of Science and Education

Allelopathic Potentials of *Cuscuta campestris* Yuncker Extracts on Germination and Growth of Radish (*Raphanus sativus* L.) and Lettuce (*Lactuca sativa* L.)

Muhammad Remy Othman[1], Sow Tein Leong[2], Baki Bakar[1], Khalijah Awang[2] & Mohamad Suffian Mohamad Annuar[1]

[1] Institute of Biological Sciences, University of Malaya, Kuala Lumpur, Malaysia

[2] Department of Chemistry, University of Malaya, Kuala Lumpur, Malaysia

Correspondence: Baki Bakar, Institute of Biological Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: baki.bakar@gmail.com

Received: April 9, 2012 Accepted: April 23, 2012 Online Published: July 26, 2012

doi:10.5539/jas.v4n9p57 URL: http://dx.doi.org/10.5539/jas.v4n9p57

Abstract

Cuscuta campestris Yuncker, commonly known as Golden dodder is an annual problematic parasitic weed in abandoned and derelict areas in Malaysia. The weed is leafless plant, glabrous, yellow-white in colour, with haustoria, sucker-like attachments to the aerial parts of a wide range of host plants. This study was instituted to assess the allelopathic potentials of *C. campestris* on lettuce and radish as test plants. Three types of treatment using aqueous extract of fresh (fc), and dried *s* (dc) and ethanol extract of dried *C. campestris* (ec) were assayed for their allelopathic effects on radish (*Raphanus sativus*) and lettuce (*Lactuca sativa*) seeds. These extracts reduced seed germination, root and shoot lengths of both radish and lettuce. The roots of radish were more sensitive *vis-à-vis* the shoots when exposed to fc, while shoots were more sensitive than roots when exposed to dc. Dose-mediated differences in shoot and root lengths of radish were registered when treated with ec. The roots of lettuce were more sensitive compared with the shoots when exposed to ec, while no measurable effect was observed when roots and shoots of lettuce were exposed to fc and dc. The results demonstrated the allelopathic effects of dodder on the tested host plants. The potentials of these extracts and their chemical constituents as bioactive ingredients for new herbicides are implied.

Keywords: Allelopathy, *Cuscuta campestris*, natural herbicides, germination, *Raphanus sativus*, *Lactuca sativa*

1. Introduction

The term “allelopathy” was first coined by Molisch (1937). Allelopathy involves the release of bioactive compounds or chemicals into the environment by plants or organisms, and their ensuing biochemical activities may affect the growth of other plant species or organism presence in the immediate environment (Rice, 1974 & 1984), or impacting predators, fungi or bacteria from growing in the area (Putnam, 1988; Rice, 1974). Tesio and Ferrero (2010) showed that allelopathic activity was present in the annual and seasonal weeds, having an impact on agricultural crops especially giving effect by inhibiting the growth and proliferation of plants. Theoretically this allelopathic effect reduced seed germination. The implication of this finding would be extended toits application in commercial agriculture, principally in reducing seed germination of weeds (Singh et al., 2003).

Plant allelopathy is a breakthrough in the field of agricultural science. Allelopathy serves as secondary metabolites, which result from the adaptation process of plants in relation to the hosts. Allelopathy evolution resulting from changes in the plant environment factors such as competition for oxygen, sources of nutrients, space and light has led to the production of secondary metabolites that serve as allelopathy (Inderjit et al., 2011). In addition, there are several types of allelopathy in the form of chemical compounds such as alkaloids, sesqui-and terpenoids, which may serve as protective materials from the animals’ herbivora (Macías, 2007). Leslie and Stephen (2003) defined that these activities involved chemical mechanisms. The presence of this mechanism is evident that internal activity also plays a role in the protection of weedy plants.

Weeds population dynamics can be influenced by several inherent factors such as seed dormancy and the prevailing agro-edaphic factors in the habitat (Baki, 2007; Baki et al., 2009). Another pertinent factor that affects plant growth include the presence of allelochemicals and the associated allelopathic activities, and this in turn