The potential significance of plant-derived chemicals in crop/weed associations

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Swain (1979) states that the majority of workers who have studied secondary plant compounds (that is, by products of major metabolic processes of plants) accept that some of them, at least, play a defensive role against insects or disease. They may also have allelopathic effects.

Recent work has indicated the allelopathic potential of the weed species *Camelina sativa* and *Salvia reflexa.* Washings of foliage of these species were prepared by immersing whole plants in distilled water for ten minutes. Seeds of phytometer species were germinated at 24?C in the dark for five days. For *Linum usitatissimum* 2 ml of washings of sterile water were applied per dish of 25 seeds on Day 1 and 1 ml on each of three succeeding days. For *Triticum aestivum* these amounts were doubled.

Allelopathic effects measured after five days were pronounced and could be either negative or positive, Table 1, Data of several workers, including Horowitz and Friedman (1971), suggest that a shift from stimulation to inhibition is probably a function of concentration,

TABLE 1. Allelopathic effects of washings of weed foliage on phytometer species

Weed species	Phytometer species	Length of radicle or first seminal root (mm)		P	L.S.D. ('t' 5%)
		Washings	Sterile water control		
Camelina sativa	*Linum usitatissimum*	68.1	52.9	<0.01	6.73
Salvia reflexa	*Triticum aestivum*	83.8	111.8	<0.001	2.55

Whilst the existence of allelochemicals derived from these weed species is established their role in crop/weed relationships in the field remains to be determined. Recent analyses have shown that the allelochemical(s) of *C.sativa* are probably derived from glucosinolates, compounds characteristic of the Cruciferae. No crucifer has yet been found to be incapable of glucosinolate synthesis (Kjaer 1976) thus, cruciferous crops might also contain allelo-chemical precursors which could be exploited as a means of competition with weed species.

The synthetic pyrethroids provide an example of useful analogues of plant-derived chemicals. A better understanding of chemical relations between plants and between plants and other organisms may provide further such examples, through harvesting of plant-derived chemicals; development of analogues, or through the enhancement of the inherent chemical defences of crop species.

Horowitz, M. and Friedman, T. (1971). Weed Res, 11:88.

Kjaer, A. (1976). In "The Biology and Chemistry of the Cruciferae", Eds. J.G. Vaughan, A.J. Macleod and B.M.G. Jones (Academic Press:London) pp.207-219.

Swain, T. (1979). In "Biochemistry of Plant Phenolics". Eds. T. Swain, J.B. Harborne and C.S. van Sumere (Plenum Press:New York) pp.617-640.