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Differential allelopathic effects of Chinese milk vetch (*Astragalus sinicus* L.) sampled at different growth stages

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Objectives

Allelopathic effects of Chinese milkvetch (CMV) were evaluated to know the potential for controlling the weed occurrence in the CMV-summer crop cropping systems. Weed suppressing ability of CMV is an additionally important trait beside the beneficial effect of CMV like nitrogen fixation and soil preservation with covering. The residue of CMV, however, from time to time can be act adversely to following crop species in cropping system. The evaluation of allelopathic affect of CMV was made to know the prediction of residual effect by growth stage of CMV on the following crop species and subsequently occurring weeds.

Materials and Methods

o CMV seeds were spread-sown in Gyeongsang National University experimental farm with a sowing rate of 5 kg 10 a^{-1} on Sep. 15.

o Only aerial part of CMV was collected at different growth stages, Apr. 13, Apr. 27, May 4, and May 25, and air dried in the shade at 25C for 7 days and forced air-dried at 80C for 48hr. Three gram of powder was extracted with 30mL of ethanol. The crude extract was diluted with a series of concentration and applied to the seeds of test plants on petri dishes.

o Total phenolics was measured by spectrophotometrically and calculated as gallic acid equivalent.

Results

o Allelophathic effect of CMV was highly dependent on the growth stage of CMV plant. The effect was decreased as CMV was matured after flowering.

o Allelopathic activity of CMV was highly related to the level of total phenolics which dropped down after flowering.

o Germination of soybean and corn was inhibited by increasing concentration of CMV extract and the effect was decreased as the growth stage of CMV advanced.

o Radicle elongation of corn was highly reduced as compared to the plumule elongation of corn and hypocotyls elongation of soybean reflecting the more effective effect of CMV exudates on monocots.

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Table 1. Effect of CMV extract on the plumule and radicle elongation of corn and hypocotyl elongation of soybean

Sampling date		Concentration			
		0.0	0.2	1.0	5.0
Apr. 13		4.43±0.27	4.36±0.58	3.64±0.48	2.03±0.47
Apr. 27	corn	4.43±0.27	4.06±0.32	2.85±0.29	0.92±0.56
May 4	plumule	4.43±0.27	3.35±0.50	2.37±0.63	2.10±0.66
May 25		4.43±0.27	3.98±0.16	3.48±0.24	2.77±0.39
Apr. 13		4.77±1.17	3.15±0.90	2.26±0.48	0.87±0.38
Apr. 27	corn	4.77±1.17	3.04±0.62	1.81±0.61	0.45±0.34
May 4	radicle	4.77±1.17	2.70±0.63	1.49±1.33	1.11±0.34
May 25		4.77±1.17	2.37±0.65	2.14±0.31	1.55±0.14
Apr. 13		9.86±1.19	9.39±0.51	9.84±0.35	4.83±0.57
Apr. 27	soybean	9.86±1.19	9.22±1.10	6.79±0.91	5.49±0.53
May 4	hypocotyl	9.86±1.19	10.50±0.54	10.12±1.59	7.87±0.23
May 25		9.86±1.19	9.16±0.42	8.73±0.37	6.88±0.46

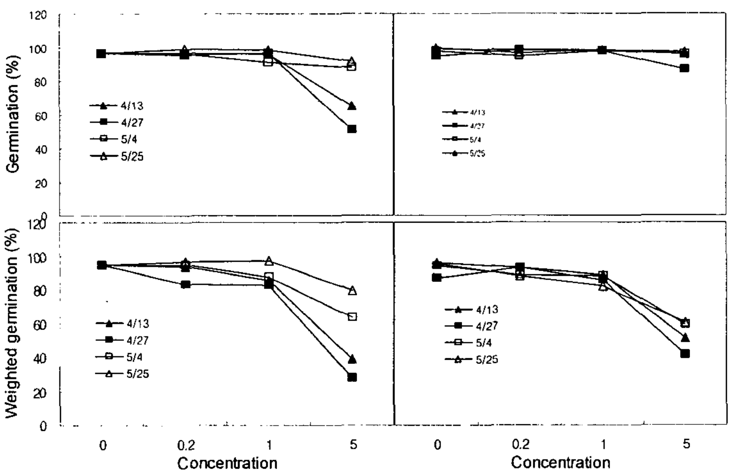

Fig. 1. Effects of CMV extract on the germination and weighted germination rate of corn and soybean. The concentration levels, 0, 0.2, 1, 5 means volume (mL) of crude extract added on a petri dish.

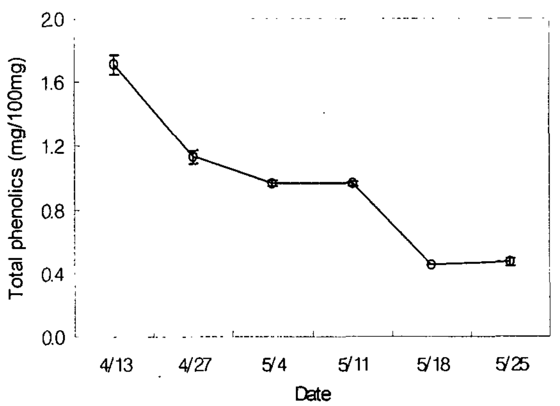

Fig. 2. Changes of total phenolics contents in CMV shoots. The amount was calculated as gallic acid equivalent.