

B6. 돼지감자(*Helianthus tuberosus* L.)에서 allelopathy물질 추출과 검정
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The Extraction and Bioassay of Allelochemicals of Jerusalem
Artichoke(*Helianthus tuberosus* L.)

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Objective

The present pesticides used for weed control have caused many problems, such as development of resistant weed and insect, environmental pollution, toxicity related health hazards in human beings and livestock. Therefore, more concerns are focused on using plants which have allelopathy for weed control, providing basis to sustainable agriculture. This study was conducted to identify the allelochemicals of *Helianthus tuberosus* L.

Materials and Methods

- Plant materials
 - Jerusalem artichoke(*Helianthus tuberosus* L.) collected from campus of ALSC, SNU.
 - Bioassay(test seeds) : Alfalfa (*Medicago sativa* L.)
Germination(%) and Hypocotyl length measured
- Isolation of allelopathic substances in *Helianthus tuberosus* L.
 - Water extraction
Dried plant components(leave, stem, root, tuber, tuber peel) were soaked in H₂O(5% w/v) for 24hrs on shaking at 25°C in the dark.
 - Bioassay of aqueous extract
 - The fractionation of solvent extract and isolation of allelochemicals
Extract was partitioned in increasing polarity with hexane, ethylacetate and n-butanol to give fractions
 - Bioassay of solvent extraction
 - Open column chromatography, Elution with increasing polarity
 - Bioassay of sub-fractions

Results

- Aqueous extracts were considered that *Helianthus tuberosus* contained fewer or less potential water-soluble substances that were toxic to alfalfa.
- Among four fractions, ethylacetate fraction showed the significant inhibition effect on bioassay with alfalfa. Further separation of an active ethylacetate fraction by open column chromatography led to the 25 sub-fractions. In bioassay of each sub-fraction with alfalfa seeds, sub-fraction No. 13 showed the most inhibitory effect on seedling growth. ¹H-NMR and Gas chromatography-mass spectrometry(GC-MS) analysis revealed that sub-fraction No. 13 was long-chain mixture of fatty acids.

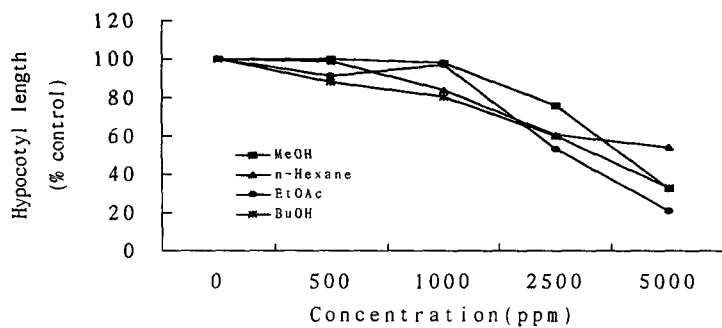


Fig. 1. Hypocotyl length of alfalfa treated with extract of MeOH, n-hexane, ethylacetate, and BuOH of *Helianthus tuberosus* L.

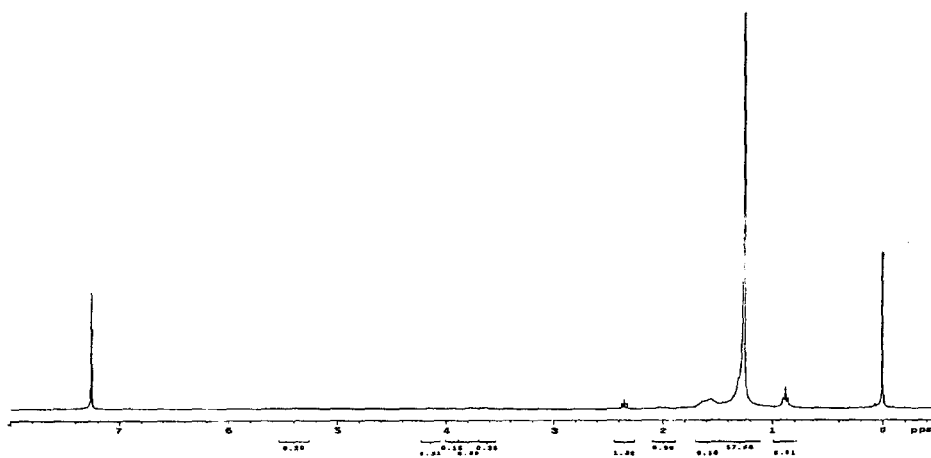


Fig. 2. $^1\text{H-NMR}$ of sub-fraction No.13(400MHz, CDCl_3).

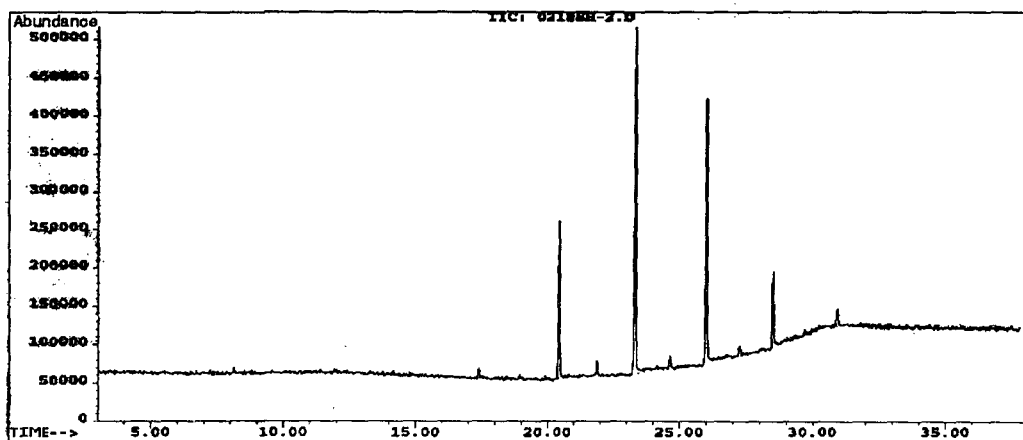


Fig. 3. GC-MS of sub-fraction No.13