THE DANDELION (*TARAXACUM OFFICINALE*) - A MONITOR FOR ENVIRONMENTAL POLLUTION?

I. KULEFF and R. DJINGOVA

Radiochemical Laboratory, Faculty of Chemistry, University of Sofia, 1, A. Ivanov Av., 1126-Sofia, Bulgaria

(Received August 11, 1982; revised May 26, 1983)

Abstract. Neutron activation analysis has been used to determine the amounts of As, Cd, Cr, Hg, Sb, Se, and Zn in the leaves of *Taraxacum officinale* and show that it accumulates these elements. The accumulation corresponds to the extent of environmental pollution. Since *Taraxacum officinale* is widely distributed it may be successfully used for monitoring metal pollution.

1. Introduction

The worldwide atmospheric distribution of anthropogenic toxic heavy metals has stimulated investigations of their influence on living organisms (plants and animals) and the development of reliable methods of air pollution monitoring. Attention has been directed to discover appropriate biological monitors since the microelement composition of plants usually reflects the chemical and geochemical features of soil and environment. Among the most investigated species are mosses (Boyarkina *et al.*, 1978; Goodman and Roberts, 1971; Harris *et al.*, 1977; Huckabee, 1973; Huckabee and Janzen, 1975; Rühling and Tyler, 1968, 1969; Steinnes, 1980), peat (Boyarkina *et al.*, 1978), lichens (Garty and Fuchs, 1982; Poelt and Hunneck, 1968; Seaward, 1973) and some trees (Dobrovolski and Rjaksinskaya, 1978; Harris *et al.*, 1977; Paradellis and Panayotakis, 1980; Sheppard and Funk, 1975; Taha and Greim, 1979). The fact that some mosses and lichens absorb chemical elements directly from the atmosphere makes them very suitable for monitoring, however, a serious problem is their restricted distribution. Sometimes this difficulty may be avoided by transplantation of the plant (Garty and Fuchs, 1982; Goodman and Roberts, 1971). However this method is quite time-consuming and the experiment could be unsuccessful because of transplant death (see Goodman and Roberts, 1971).

*Taraxacum officinale* (dandelion) is a widely distributed plant growing at various latitudes and altitudes (Stoyanov *et al.*, 1966) near industries, in cities and in biological preserves. Thus its distribution makes it a candidate for biological monitoring.

In the present paper we communicate some preliminary results obtained in the investigation on the content of some trace elements in the leaves of *Taraxacum officinale*. 

2. Materials and Methods

2.1. Sampling and Sample Preparation

Leaf samples of *Taraxacum officinale* were collected from three different regions in Bulgaria. Region 1 is situated in the vicinity of a non-ferrous metallurgical plant. Region 2 is a living quarter in Sofia far from the industrial part of the city. Region 3 is situated high up in Rila mountains (about 2200 m above the sea level) very near to the regional background station in the system of the World Meteorological Organisation. Region 3 may be considered unaffected by direct anthropogenic and industrial pollution, being distantly located from human habitation and activity.

Samples from region 1 were collected at different distances from the emitting source along the direction of the highest wind frequency (determined from the annual wind

![Graph showing gamma-ray spectra of dandelion samples collected at different locations.](image)

Fig. 1. Part of the γ-ray spectra of dandelion samples collected at 0.3 km from a non-ferrous metallurgical plant, region 1 (upper spectrum) and in the city of Sofia (lower spectrum). Irradiation time – 12 hr, cooling time – 5 days, measuring time – 3000 s.