ESTIMATION AND PROPERTIES OF SOME HERBICIDE RESIDUES IN SOIL UNDER DIFFERENT CONDITIONS

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ABSTRACT

Knowledge of the mechanisms by which herbicides are transproted, stroed or decomposed in the soil can contribute towards the more efficient and economic use of these compounds and would also indicate ways in which deleterious side effects might be anticipated and corrected.

The bensulfuron- methyl and thiobencarb were degraded rapidly in caly soil comparing with calcareous and sandy soils. The persistence of the two herbicides was relatively high in sandy soil than calcareous and clay soils- PH ranged between 5- to 7 was slightly affected the degradation of the two herbicides. The rate of herbicide degradation was increased above PH7. Autoclaving soils for sterilization suppressed the degradation of the two herbicides.

Degradation of both herbicides in physicochemical and biochemical processes also was studied througbouf the present investigation.

The herbicid bensulfuron – mehtyl showed more adsorption capacity than thiobencarb and the caly soil adsorbed more herbicide than other soils. However the equilibrium time for the two herbicides was reached 180 min in the three soils tested.

K and n values of herbicide adsorption isotherm indicate that both of initial and subsequent adsorption of clay soil were higher than other soils.

The distribution coefficient values (kd) for bensulfuron – mehtyl were higher than thiobencarb.

Down – ward movement and leaching of herbicides in soils, effect of soil type, herbicide concentration were also studied. Thiobencarb was found less mobile in clay than sandy and calcareous soils. The amount adsorbed on soil surface was increased by increasing the concentration of the herbicide, while their residues in the leachate were decreased. On the other hand, increasing the leaching water volume decreased the herbicide adsorption in the first layer and did not affect the amounts of herbicide recovered from the other layers.

Key words: bensulfuron- methyl, thiobencarb, herbicdes, soil, persistence, abiotic, biotic, degradation, leaching.

APPROVAL SHEET

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I- INTRODUCTION

Weed are an integral part of agroecosystem. Many weed species have coevolved with crops and depend on the way that the crops are cultivated. Weed are defined as plants out of place or plants growing where they are not wanted. They compete with the crop for water, nutrients and light and therefore reduce crop yields. They interfere with harvest operations and are carriers and transmitters of pests and crop diseases, and for these reasons they showd be controlled. Recently, we have come to consider weed not just strictly as plants out of place, but we have also become aware of their benefits. Weeds contribute to biodiversity directly – in central Europe about 300 wild plant species are considered as weeds – and indirectly as hosts for many other organisms which are dependent on them including predators **(Weiss and Stettmer , 1991).**

Chemical weed control is considered as the most rapid, efficient and economical method of weed control in many developed countries of the world . Chemicals which cause phytotoxic effects on treated plants are called herbicides. The weed Science Society of America

(WSSA) has defined a herbicide as " a chemical used for killing plants or interrupting their normal growth".

Weed Science has progressed tremendously in the past six decade. New herbicides have been developed with great efficacy for weed control and selectivity in various cultivated crops. Today , there are approximately 200 different herbicides in the world market with thousands of various formulation and combination products . Herbicides account for 60 to 70% of pesticides sold for agricultural use, by volume . In undeveloped countries herbicides account for a much smaller percentage of total pesticide use, and a much higher proportion of the population is required for farming **(Duke 1996) .**

The effective use of herbicides in crop production is based on their ability to kill weeds without injuring the crops. This criterion is called selectivity **(Leafe 1962).** The extent to which a plant responds to herbicide application is a measure of susceptibility; whereas the degree to which it can withstand the effects of herbicide action is called tolerance. The susceptibility of plants to herbicides is influenced by the interactions among the plants, the herbicides and the environment. Such complex interactions include morphological characteristics of treated plants, their inherent physiological and

biochemical processes, stage of plant growth, potenecy of herbicide toxicity, and the herbicide concentration which reaches the target site of action, the environmental factors such as light, moisture, temperature, wind and the different physical, chemical and biotic soil characteristics.

Many factors affect the phenomenon of herbicide selectivity. These include : differential leaf wetting, differential absorption and translocation of herbicides, location of the growing point, growth habits, position of herbicides in the soil, selective placement of herbicides, chemical protectants and protective barriers, and biophysical and biochemical processes. It is worth to note that, during the 1990's herbicides use for selective weed control may account for at least two thirds of all pesticides use in agriculture **(Stephenson and Yaacoby 1991).**

The problem of herbicide concentration has recently acquired great importance due to increasing number of chemicals used in agriculture . To this, it is added the accent on a better quality of life, with a notable necessity for a greater food production which makes the use of herbicides inevitable . This type of contamination, variable and diffuse, gives rize to two very important problems : herbicide accumulation in the soil and its

passage into ground water which may cause general damage to the ecosystem.

The soil microbial community is an important component of the soil ecosystem and plays a dominant role in soil fertility and material cycling. An effect of agrochemical on the activity of the soil microbial community are therefore of big concern ***(*xu *et al., 1992)***.

The present study was carried out to throw light on the behavior of some herbicides, in clay, calcareous and sandy soils. The following aspects were considered, adsorption, downward movement, persistence, metabolism in relatin to studied factors.