CYTOLOGICAL AND PHYSIOLOGICAL STUDIES ON TOPOGARD HERBICIDE

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By

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بسم الله الرحمن الرحيم

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DECLARATION

I hereby declare that this thesis has not been submitted for a degree at this or any other university.

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INTRODUCTION

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Weeds have been a part of the agricultural scene since man first started cultivating crops, more than 10000 years ago and they are still a major problem today. Weeds are harmful to crops as they compete for water, compete for light, for nutrients, for space above and below ground. In addition some weeds as Cuscuta may be parasitic on crop. They also sharply reduce the productivity per acre. Thus, weeds reduce rice yield by 34-68% in Latin America, maize yield was reduced by 53% by allowing weeds to grow (Fletcher & Kirkwood, 1982). Weeds also increase the difficulty of harvesting and entail seed cleaning. Even in area not under crops they may be harmful, for example in railway tracks, canal and open grazing country.

Obviously, anything that we can do to reduce this heavy toll must be done to face the problem of feeding not only our present population but that which is rapidly increasing.

The mechanical revolution completely altered agricultural methods and now the chemical revolution is carrying on to new heights of efficiency. A major component of the chemical revolution is the use of herbicides to control undesirable plants.

Chemical weed control is a miracle of our technological age. Long known as one of the most arduous of agricultural operations, weed killing has taken on an entirely new aspect as chemical after chemical is added to our arsenal of herbicides.

This century has showed an increase in both the production and use of herbicides and as a result yields of cereals, soybeans, cotton, sugar beets and many other crops have increased in some cases of 100% or more.

Thus, while the use of fertilizers and new high-yielding crop varities have contributed greatly to the "green-revolution", chemical weed control has been at the forefront in technological achievement, (Ashton and Crafts, 1981).

Although the future of chemical weed control seems bright and continued testing and adoption of new compounds is proceeding at an accelerating rate, a new element has been thrust into the field.

With the discovery that certain types of insecticides persist for years in organisms, and in fact, in the total environment , all pesticides are now being viewed with suspicion by people interested in protecting our world from broad-scale pollution (Ashton and Crafts [illegible]).

The solution to this problem may come from increasing the researches dealing with non chemical weed control methods as the physical and biological ones.

However, the increment in the number of chemical compounds which are proved to be efficient in weed control, refer to that the use of the chemical means in this respect is still of major importance. Thus, several compounds belonging to the triazines proved to be effective in weed control. In this connection, the herbicidal properties of chlorazine were detected by Gast *et al.* ([illegible]) and [illegible].

Selectivity as the most important character of the herbicides is not absolute but selectivity is a relative effect. The term selectivity refer to the fact that, under a given set of conditions certain species of plants (weeds) are killed or seriously injured, whereas other species of plants are not injured (crops). However a given herbicide is selective to a particular crop only within certain limits of rate, environmental conditions and method of application. The desired selectivity is the result of favorable interaction of three components (1) the plant, (2) the herbicide, and (3) the environment (Ashton & Crafts 1981).

Also absorption and translocation of herbicides are of major interest, since a compound must enter the plant and move to its site of action to be effective as a herbicide. Such processes depends primarily on its molecular configuration, which in turn determines its chemical and physical properties (Fletcher & Kirkwood 198[illegible]).

The absorption and translocation of the triazine herbicides following foliar applications has been fairly limited as compared with studies of root application. In this respect, Davis et al. (19[illegible]) reported that almost no absorption of simazine occured through intact leaves of maize, cotton or cucumber. Donalley and Rann (1961) stated that no basipetal translocation of atrazine occured following its foliar use. In addition, Foy (1964); Dexter et al. (1966); Jones & Foy (1972); Hilton et al. (1974); Müller & Sanad

(1975); Kern et al. (1975) studied the foliar application of different triazines and found that there was no appreciable movement of triazines downward or even out of the treated leaf. Acropetal movement, on the other hand, of all triazines tested occured readily. Thus, distribution pattern of the triazines was suggested to be in the transpiration stream ; apoplastic movement (Burt, 1974). In this connection, Shone and Wood (1976) said that, in general, root uptake is more important than shoot uptake on the herbicidal action of the triazines. In addition, Eshel et al. (1975) stated that terbutryn is absorbed well by root but not by emerging shoot of broad bean and other species.

Keeping the above reports in mind together with the recommendation provided by the producing company, Topogard a herbicidal triazine used in the present work was applied as a pre-emergence one. In this connection one may refer to the work of Lawson (1978) who insure that Topogard was one of the best herbicides that control weeds when used as pre-emergence. Terbutryn (one of Topogard constituents) was stated by Kukula et al. (1965) to be highly effective in broad-leaved weeds control when used as