WEED PROBLEMS IN SAUDI ARABIAN CEREAL CROP PRODUCTION

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ABSTRACT

The modern agriculture in Saudi Arabian desert is a very recent happening of unprecedented rapidity. Huge areas of deserts have been converted into usually very large farms with the state of the art irrigation systems and using the most recent available technology. Before this phase of agricultural takeoff, there existed a sort of "garden of Eden" concept implying absence of weeds in the "sterile" desert if brought under agriculture. Unfortunately, this did not prove to be true. Like all other agricultural areas, the Saudi Arabian agriculture too has faced weed problems. The magnitudes of weed problems, the kinds of noxious weed in cereals, the changing spectra of the weeds, and the degrees of success in the weed control over the past decade have been presented in this paper.

Introduction

The history of Agriculture in Saudi Arabia parallels the history of human civilisation but has been of a special nature constrained by or rather adapted to the climatic and environmental limitations. The western coastal plains grew millets on alluvial fans at the mouth of each wadi or along flood streams where fields were spate-irrigated once a season by impounding flood water in the fields with 1 to 2 meter high embankments. The moisture retained in the field was enough for one crop of sorghum. The west-facing mountain sides supported a system of terraces spread throughout the length of Arabia in the west. The water harvested or diverted through this system not only supported a multitude of crops and fruit and coffee trees but also provided for the human needs for water and of his livestock. The residents of the vast deserts did have knowledge of crop culture and fruit culture but here the activity was naturally restricted to very limited areas, the oases or where underground water was of desirable quality and which could be brought out by manual means or with the help of draft animals to irrigate limited areas under crops or date-palm orchards or other fruit trees.

The weeds were a part of the ancient agriculture in the region and were taken for granted in the agricultural areas. In a way, these served as the source of fodder for the animals as a by-product of crop husbandry through manual weeding.

Modern agriculture in Saudi Arabia is hardly two decades old. But it exploded over vast desert areas only about a decade ago. So did the weed problem especially when, because of climatic and economic reasons, only wheat (or barley) has been grown in most farms year after year. Some of the earlier workers, e.g. Parker, 1973, had visualised the deserts as almost sterile and the field carved out of the deserts, therefore, as totally weed free-- a Garden of Eden concept. But sadly, it was not to be so. The Ministry of Agriculture did anticipate weed problems and kept monitoring the situation. It has, therefore, been possible to keep track of the situation and to keep the weed problems mostly under control.

The weed populations in cereals are rather characteristic. Indeed it is often possible to tell the age of the farm by looking at the composition of samples brought in by a farmer to our lab. New farms, one to two years old have a high percentage of desert flora as weeds, consisting of *Plantago* spp., *Sclerocephalus arabicus*, *Bassia muricata*, *Salsola imbricata*, *Picris* spp., *Cakile arabica*, *Savigva parviflora*, etc. Usually after second year they disappear. But then there is an explosion in the population of *Lolium* spp., especially *Lolium rigidum*. The rye-grass is what we call a gentle weed, easily

controlled by Dichlfop-methyl application even through the center pivot irrigation system. A good control of rye-grass, it is estimated, can increase yield by one to three tons per hectare. At about four years of age, the weed situation takes a serious turn when population of Phalaris minor explodes usually accompanied by an explosion also in the populations of Polygonum bellardi (also variously identified as P. argyrocoleum, P. patulum) Malva parviflora and Avena spp., all of which assume serious proportions. There are outbreaks of some other weeds but in restricted areas. For example, in one area, suddenly Stellaria media, alone, appeared as the most serious weed. Recently, in another area, Bromus diandrus has appeared as a terrible weed first noticed in 1987 and is spreading rapidly. Polypogin monspeliensis is another grass which has assumed very serious proportions in certain areas.

The above changes in the weed spectrum are ascribed to three factors, i.e. i) the introduction of a weed or its initial presence in a field, ii) successful control of one or two more prominent weeds in a field, ii) explosion of the population of one or more of the remaining weed species. The earlier attempts in Saudi Arabia were to control the Lolium rigidum and other rye-grasses in wheat fields through the use of Dichlofopmethyl. This chemical controlled rye-grass very well. Theoretically, it should have controlled Phalaris minor and Avena spp. too, but factually Phalaris minor and locally Avena spp. and Polypogon monspeliensis populations exploded following control of rye-grass populations.

A number of chemicals were available in the Saudi market claiming to control these weeds. The one recommended by the Ministry of Agriculture was sold under ICI trade name GRASP or Tralkoxydim. It appeared to control the grass weeds quite well. However, over a few years, it was realised that Phalaris and in certain cases Polypogon monspeliensis had taken over the fields. Grasp controlled these two grasses only partially resulting in the explosion of the population of these two weeds.

Grasp + Isoproturon application improved the control but it also did burn up quite a few wheat fields where soil was sandier than sandy loam or if frost or near frost conditions followed the application. At the moment, Dichlofopmethyl plus Isoproturon (1.5 - 2 1 +0.5 l/ha) through center pivot after 4 leaf wheat stage seems to be offering a good control of the grass weeds. In sandier soil two sequential applications (at 25 days and 40 days after planting) with half the concentration each time are reported to have worked in certain areas.

Bromus proved to be a problem narrow-leaf weed. Several alternate recommendations were issued by the Saudi Ministry of Agriculture. Last year the most encouraging report was that post-plant, pre-emergence application of Chlorosulfuron at 15 gr per hectare had given a very satisfactory control of Bromus diandrus in wheat in the region most affected by this weed. Normally, Chlorosulfuron is not a weedicide selected by farmers because, although they are growing wheat year after year, they would still like to keep the option of putting in some other crop too in the succeeding year/s. Also, Chlorosulfuron had previously shown adverse effects upon the wheat crop in the predominantly sandy soils, often pure sand, in Saudi Arabia. Dichlofopmethyl + Isoproturon also offer a good control.

Of the broad-leaf weeds, the desert flora component usually disappears after a couple of seasons. However, the farmers often bring in truck-loads of sand from sand dunes and spread it in their fields in order to increase the thickness of the sand layer. This of course dumps in another lot of seeds of desert flora. Bromoxynil had been the only recommendation from us for control of broad-leaf weeds. But the farmers often lured by cheaper price of 2,4-D would use this weedicide which did control many broad-leaf weeds when applied through boom sprayer. However, most often this chemical was a miserable failure when applied through the center-pivot system. Bromoxynil was very

effective through center-pivot against the young seedling stages of most broad-leaf weeds. But it failed to control or give a good control of Polygonum, Malva parviflora or Chenopodium species. These weeds sometime assumed such a serious proportion that the farmers opted to burn the field rather than end up with defeated, twisted combines in the battle for harvesting! Bromoxynil plus MCPA or Bromoxynil + MCPP is now a standard recommendation for control of broad-leaf weeds because of the reliably satisfactory results achieved from this combination. The combination of Bromoxynil plus MCPP was used to control broad-leaf weeds when Stellaria media was the major serious weed.

The resent trend in the herbicide market is to bring in some general purpose weedicide or combination of weedicides which might effectively control the narrow-leaf weeds as well as the broad-leaf weeds but yet would not have a residual effect lasting more than one season. Towards this end for example lasting more than one season. Towards this end for example Ciba Geigy are carrying out trials on the application of TOPIK (Ciba Geigy Code) plus Logran through center pivot irrigation at Topik 300 ccs/ha + Logran 15 grm/ha. In the trials it seems to have worked very well. Trials on incorporated use of Logran are also being planned in suitable soils. A preplant incorporated herbicide for use in sandy soil would go very well with the irrigation system in general use in Saudi Arabia.

The present paper is primarily intended to share with the interested persons the problems encountered in weed control and results achieved in the cereal crop production in Saudi Arabia. Also, it is hoped that the chemical companies manufacturing weedicides might get interested in our problems and come up with a better and cheaper set of weedicides for use in the sandy fields of Saudi Arabia under cereal production. Saudi Arabia offers a huge market for agricultural chemicals.

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