MAXIMIZE THE EFFECTIVENESS OF HERBICIDES RESISTANCE INJECTED THROUGH MODERN PRESSURIZED IRRIGATION SYSTEMS

By

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B.Sc. Agric. Sc. (Agric. Engineering), Ain Shams University, 2013

A Thesis Submitted in Partial Fulfillment

Of

The Requirements for the Degree of

MASTER OF SCIENCE

in

Agricultural Sciences

(On-Farm Irrigation and Drainage Engineering)

Department of Agricultural Engineering

Faculty of Agriculture

Ain Shams University

2019

Approval Sheet

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ABSTRACT

Shaimaa Badr Yahea Elsayed: Maximize the Effectiveness of Herbicides Resistance Injected through Modern Pressurized Irrigation Systems. Unpublished M.Sc. Thesis, Department of Agriculture Engineering, Faculty of Agriculture, Ain Shams University, 2019

Weeds are causing big losses for general cultivation, especially in the most important elements (water and fertilizer, Space, Light) and for being the primary host for many diseases and agricultural pests, which affect the overall production.

And the fact that herbicides are used by commercial product its recommendations based on traditional agricultural recommendations, which aim to profitability mainly, **so the aims** of this investigation are study maximize the effectiveness of herbicides resistance injected through modern pressurized irrigation systems.

Two application techniques were used for weed control with pre-emergence Pendimethalin herbicide (Stomp 50% EC) was injected via drip irrigation systems (surface and sub-surface) with three dosage rate (100%, 75% and 50%) of herbicide recommendation dose (1.7 L/ fed) using venture device, secondly by conventional spraying using knapsack sprayer and control without treatment.

Some of the observed results can be summarized as following:

1. Sub-surface drip irrigation increased water use efficiency.
2. The best weed control efficiency (82%) was achieved with herbigation technique under sub-surface drip irrigation, compared with surface drip irrigation and conventional spraying when knapsack sprayer had used.
3. The highest productivity (7.8 &7.4) ton/fed was achieved under sub-surface drip irrigation with 100%, followed 75% which the mean difference between them was not significant.

4. The best concentration of the herbicide is 75% from recommendation rate because is not significantly difference between 100% and free of herbicide residues.
5. Herbigation is more efficient and lower cost than conventional spraying.

Key Words: Drip irrigation systems, Herbigation, Weed control, Herbicide application techniques, Herbicides injection, Pendimethalin, Herbicide residues.

ACKNOWLEDGMENT

First of all, glory, praise and gratitude are due to almighty **Allah** for supporting me all the way of my life.

I would wish to express deep thanks, appreciation and sincere gratitude to **Prof. Dr. Mahmoud M. Sakr,** the president of Academy of Scientific Research and Technology and **Prof. Dr. Merit Rostom,** Manager of Scientists for Next Generation program (SNG) for Provide Grants and full support to superior researchers and deep thanks to all the staff members.

I would wish to express my greatest appreciation, deepest thanks and gratitude to **Prof. Dr. Ahmed Abo El-Hassan Abdel-Aziz** and **Prof. Dr. Khaled Faran El-Bagoury** Professors of Agricultural Engineering, Department of Agricultural Engineering, Faculty of Agriculture, Ain Shams University, for extend a helping hand to the research problems, handling the problem solving method, provide continuous advising throughout this work, valuable suggestion and revising the thesis.

Sincere gratitude and deep thanks and appreciation to **Prof. Dr. Mustafa Mahmoud Mustafa,** Senior Researcher Emeritus of Agricultural Engineering, Agricultural Engineering Research Institute, Agriculture Researches Center, for kindly supervision, great efforts during the preparation to the Grant of Academy of Scientific Research and Technology with possible help, guidance and continuous support and encouragement, providing me with all required facilities and experience throughout the period of my study in addition to revising the manuscript.

Great thanks to all the staff members of Agricultural Engineering Research Institute, Dokki, Giza, Egypt, for their help and cooperation. And friendly professional help of all the staff members of Agricultural Engineering Department, Faculty of Agriculture, Ain Shams University.

Finally, great thanks to my **father, mother, husband** and all members of my family for their support and attention.

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INTRODUCTION

Weeds are causing big Annual losses in crop yield and quality, combined with the costs of weed control which are the greatest in the World **"U.S. Environmental Protection Agency, 2012**" (World pesticide expenditures at the producer level totaled nearly $56 billion in Between 2008 and 2012, expenditures on herbicides consistently accounted for the largest portion of total expenditures in all years Within the agricultural sector (approximately 45%), followed by expenditures on insecticides, fungicides, and other pesticides, respectively).

Under Egyptian conditions weeds cause low economic outcome 20-30 % and it could reach 70 -80 % in some weak growing crops; **Weed Research Central Laboratory (WRCL), 2012**.

In addition to the amount of herbicides used in Egypt almost doubled during 2012-2016 according to Agriculture pesticide committee (APC), Ministry of Agriculture and Land Reclamation **(Egypt, 2017)**

As herbigation what's considered one of the most Chemigation technique used by injecting the herbicides via water of irrigation systems, is a relatively recent development in weed control technology. Research findings have established a fact that some of the herbicides exhibit good activity by providing control of target weeds when applied through irrigation water by injecting the herbicides via water of irrigation systems.

The aims of the research

1. Using the modern pressurized irrigation systems for weed control and maximize the benefit of herbicides.
2. Evaluate the effective of herbigation and spraying technique.
3. Increase the productivity with lower costs.
4. Obtaining an export product with high quality free from herbicides residues.
5. Reduce environmental pollution.

REVIEW OF LITERATURES

2.1 Drip Irrigation system

Drip irrigation, also known as trickle irrigation, functions as its name suggests. Water is delivered at or near the root zone of plants, drop by drop. This method can be the most water-efficient method of irrigation, if managed properly, since evaporation and runoff are minimized. In modern agriculture, drip irrigation is often combined with plastic mulch, further reducing evaporation, and is also a means of delivery of fertilizer. The process is known as fertigation, **FAO, 1990**

Surface and subsurface drip irrigation is a type of micro-irrigation system that has the potential to save water and nutrients by allowing water to drip slowly to the roots of plants, either from above the soil surface or buried below the surface. The goal is to place water directly into the root zone and minimize evaporation. Drip irrigation systems distribute water through a network of valves, pipes, tubing, and emitters. Depending on how well designed, installed, maintained, and operated it is, a drip irrigation system can be more efficient than other types of irrigation systems **(Goyal, 2012).**

Badr M. A., et al **(2010)** studied the efficiency of subsurface drip irrigation for potato production under different dry stress conditions, to determine the effect of two irrigation methods, surface and subsurface drip irrigation combined with four irrigation levels, 100, 80, 60 and 40% of crop evapotranspiration on yield and yield components of potato grown on sandy soil. The field experiments were conducted in the years 2008 and 2009. They reported that a significant higher potato yield under sub-surface drip irrigation compared to surface drip irrigation. Under sub-surface drip irrigation, reducing amounts of applied water to 80% Etc. gave comparable yield and yield components to surface drip at full irrigation supply, indicating that 20% irrigation water can be saved

without affecting the potato yield. At all irrigation levels, subsurface drip recorded higher water use efficiency (WUE) over surface drip. Maximum value was observed at 40% Etc. Fertilizer use efficiency (FUE) was also higher under sub-surface drip and reduced significantly under both irrigation methods with increasing water deficit. These results suggested that sub-surface drip offers the potential of better water management with respect to saving and distribution of water in the root zone and to obtain maximum yield accompanied by highest water and FUE.

Hussein et al. (2014-2015) studied water losses caused by weeds were and remain important constraints, worldwide, in raising the plant productivity and crop production and discuss the potential of some applications for cutting these losses. Depending on the available literature review it could concluded that weeds need more water than many crops and many weeds are known to be "water wasters". Therefore, proper weed control raises available soil water for crop production. Some common annual weeds growing with crops transpires about four times more water than a crop plant and use up to three times as much water to produce a pound of dry matter as do the crops. Under water stress condition weeds can cut crop yields more than 50% through moisture competition alone. The competition between weeds and crops are depending on weed density, the plant's physical characteristics rather than the aboveground biomass. So, perennial weeds can be less affected by drought than annual weeds. Evaporation from the soil accounts 25- 50% of the total water used, therefore a layer of mulch can cut evaporation by as much as 75%. Any weed management measure that leads to cut the loss water is important for the sustainable agricultural development.

2.1.1 Herbigation via drip irrigation systems

Herbigation is an application of herbicide via irrigation water can be effectively done through drip irrigation. Drip irrigation (DI) is advanced method of precise application of water most efficiently at the