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EFFECT OF PERIODS AND REPETITION OF THE BURNING METHOD IN THE CONTROL OF WATER HYACINTH (*EICHHORNIA CRASSPIES*) PLANT

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Abstract

The experiment carried out using basins under field conditions of the Faculty of Agriculture and Forestry, University of Mosul in the season 2010-2011. The aim of study is using the mechanical method (burning method) for controlling water hyacinth and decrease the pollution on aquatic environment. The study included a two factors, influence burning repetition and periods of the burning in the control of water hyacinth weed. The experiment was applied in randomized completed design it was applied in three repeaters. The results showed the no influence on studied traits in the case of an incineration process one time while the increase in the number of times the incineration twice to a negative impact on the studied traits of the water hyacinth plant this effect was more severe in the event of an increase in the replicates of burning to three times, with low in the all studied traits (length of plant, the number of leaves, length of spike, number of flowers and weight wet and dry weight the total vegetation and roots).

Key words*: water hyacinth, burning, repetition burning.*

INTRODUCTION

Water hyacinth of floating plants on the surface of the water and usually floats by rafts publish on the water surface, which consists of a roots group under the water's surface and total vegetative floats above the surface of the water, there are several names for this plant, including the flower Nile, yanst water or herb Nile (*Eichhornia crassipes* (Mart.) Solms), belongs to the family Pontederiaceae, also called family Pickerel weed family. Belong to this family six genera and about 20 species, and the plants of this family are either floating on the surface of the water or floating and flourish in the warmer regions of the globe. There are several species of the genus *Eichhornia* most important (*E. crassipes*) for being a dangerous weed, which occupies the eighth spot (Holm et al., 1977). The ornamental plant enter in Irak in mid 1980s because it have purple flowers and some civil nurseries selling this plants as ornamental plant and they spread to the rest of the other areas currently present in separate regions in Mosul, and speed spread and growth of it led to more problems impeding the flow of water in irrigation channels and drainage and also reduced quantities of water consumption and impeded the work of the hydro power and pumping stations as well as a haven for many of the diseases and insects in the depletion of oxygen dissolved in the water, which negatively affects life's bountiful fish and some of the people who depend on fishing. In order to reduce the pollution caused by the excessive use of herbicides and non-compliance with the control programs and the recommended concentrations used for control, the burning is the one of mechanical methods used to combat weed widespread in agricultural and non-agricultural land. There are several methods that have been used to combat this weeds in many countries where preventive, mechanical, biological and chemical methods have been deployed. So researchers and studies in this field are interested in working hard in the preparation of control programs in order to limit the spread and control of the weed, its money has an impact on the human and its sources of livelihood and other resources. Due to the lack of sources on the use of the method of burning in the control against the water hyacinth, it was pointed out that this method was used with the reed plant, Common reed, *Phragmites australis* (Cav.)Trin., because it is in an environment similar to the environment of

the water hyacinth plant. Burning in general does not completely reduce the ability of wild reed to grow because it is difficult to burn roots and rhizomes which are often covered with a thick layer of soil or soil and water (Beall, 1984). Of course, this result applies to the water hyacinth, where if burned green parts and leaves, it may be difficult to reach the burning to some of the leaves and roots because they are covered with a layer of water, which leads to the re-growth of these parts. Several studies have indicated that the date of burning of cane has an effect on plant density and growth. Burning at the end of summer is better than burning in winter and spring (Cross and Fleming, 1989). In an experiment conducted by (Thompson and Shay, 1989) in the Marsh Marshes (Delta March Manitoba), he found that burning in spring, summer and fall leads to a higher growth rate in the vegetative growth but shorter and thicker but the biomass of the vegetative group was greater for the plants burned In the spring and fall while they are lower in plants that were burned in the summer. This is due to the fact that plants whose growth season was in the spring and fall gave them the opportunity to grow well. Burning leads to a doubling of the size of the biomass on the surface of the earth due to the availability of light and soil ventilation around the rhizomes (Graneli, 1989). The same researcher recommended that the burning of cane plants in winter causes slight damage to plants, while the date of burning in the period of emergence of plants leads to the killing of the total vegetative almost completely. (Uchytil, 1992) found that burning of wild reed plants when growing well and intensely is more efficient, the high heat resulting from burning vegetation also causes damage or death to reed rhizomes found beneath the surface of the soil. The objective of the research is to study the effect of the recurrence of the date of burning in the fight against the water hyacinth, as well as reduce the percentage of pollution caused by the use of chemical herbicides in control.

MATERIALS AND METHODS

Effect of repeated burning at different dates in the controlling of water hyacinth

This experiment was carried out in basins where it was placed under the conditions of the field of the Faculty of Agriculture and Forestry, University of Mosul on 3.03.2010, three plants were taken from the basin, which was prepared in the field length of 15 m and width 6 m in each pot, which number 30 and dimensions 73 cm length and width 32 cm and depth of 33 cm. This element was covered with thermal insulated edges of aluminum to preserve the element of heat consisting of the burning process and the burn tool is a regulator + gas tube + burner.

Where the factors of the experiment included one factor is the factor of burning times and repetition as follows:

1. Burning one after month of comparison in day 12.07.010.
2. Burn one after a month + burn again after 10 days of the first burn.
3. Burn one after a month of comparison + burn three after 20 days of the first burn.
4. Burning one after two months of comparison on day 12.08.2010.
5. Burn one after two months of comparison + burn the second after 10 days of the first burn.
6. One burn after two months of comparison + burning three after 20 days of the first burn.
7. Burning one after three months of comparison on day 12.09.2010.
8. Burn one after three months of comparison + burn second after the 10 days of the first burn.
9. Burn one after three months of comparison + burn the second after 20 days of the first burn.
10. Comparison (without burning).

Basins were distributed at random within the design (CRD) and with three replicates. The water was added twice a week to complete the water volume in the basin to 77088 cm^3, using the same water source used in the first experiment. A basin was randomly selected for each treatment and burned by the burner for one minute and repeated three times. The experiment was analyzed according to the random complete design of simple experiments (CRD). I used the computer according to the (SAS) program and used the Dunkin Multi-Range Test to compare (Al-Rawi and Abdul-Aziz, 1980).

RESULTS AND DISCUSSION

Plant height (cm)

Table 1 indicates that the height of the Nile flower plants was not significantly affected by the one-time burning process and its various dates (12.07., 12.08. and 12.09.2010). In the case of repeated burning two times, the same table indicated that the process of burning at the first date of the plant life (22.07.2010) and twice did not significantly affect the attribute of plant height, but the progress of the plant age, after the process of burning after a month or two months and the repeat of burning (55.72 and 52.18%) treatment of burn twice and for the second and third seasons, respectively, compared to the plants that were not treated by burning. This is due to the fact that the burning process was carried out at the stage where the plant during this period in the stage of active growth and despite the influence of this process in total vegetative the effect of burning was temporary, as the stolon and daughter plants were able to form new growths and daughter plants new where they were about the same height as those plants that were not treated with burn. The results were taken at the end of the experiment, after about eight months. This period is enough for a plant to give these growths. As for the plants treated late in the treatment, it seems that the plants treated with burning were in a good growth stage and so the burning process led to significant damage in the vegetative group and when the plant returned to grow again there was a second burning, which led to the weakening of the plant, negatively affect the height of these plants during the time period between the treatment procedure and the period of termination of the experiment compared with the comparison treatment. In the case of repeated burning of three times and their different dates, all these factors have resulted in a significant decrease in plant height (61.34, 77.87 and 76.64%) for the burning processes (2.08., 2.09. and 2.10.2010) which were burned three times respectively.

Length of inflorescence (cm) and number of flowers / plant

The process of burning one time and its different dates (12.07. and 12.08. and 12.09.2010) and also when the burning (22.07.2010 + 10 days of the first heartburn) The length of the inflorescence (cm) and the number of flowers/plants of the water hyacinth plants were not significantly affected compared with the comparison treatment (Table 1). In the case of plant age progress after the burning process after a month or two months and repeated burning twice resulted in a significant decrease for two adjective (61.80, 63.87, 54.72 and 54%) for both the two adjective after a month or two months of burning twice compared to Comparative Plants. In the case of repeated burning three times and their different dates, it all these treatments significantly reduced the length of the inflorescence (cm) and the number of flowers/plant of the water hyacinth (37.57, 75.77, 100, 45.45, 72.73 and 100%) for the third burn with their different dates and the two adjective, respectively, compared with non-treated plants.

Number of leaves/plant, leaves area (m^2/m^2)

It is noted from the same table that the process of burning one time at the date (12.07.2010) did not significantly affect the number of leaves/plant as well as the of leaves area (m^2/m^2) compared with the treatment of comparison, but it was observed there is a significant effect of the two adjectival on the burning date (12.08. and 12.09.2010). Morally decline was observed of these two adjectival (43.5, 38.83, 35.97 and 23.17%) for both the two dates respectively. In the case of repeated burning of two times, the same table indicated that the process of burning on the first date (22.07.2010) and twice did not significantly affect the number of leaves/plant of the water hyacinth compared with the comparison treatment, but it was observed there is a significant effect of the leave's area in this date, where the decrease was 29.27% compared to the unburned plants. In the increase plant age, after burning after a month or two months and repeated burning twice, resulted in a significant decrease in the number of leaves/plant and the leaves area (m^2/m^2) of the water hyacinth by 64.67, 79.5, 75 and 84.15% after month or two months after burning twice compared to the Plants that did not burn. This may be due to the fact that the plants that were burned by a late date were in the growth and total good vegetative and when treated with burning, this process led to significant damage to the vegetative group and when the plant to

compensate the growth again, there was a second burning, which led to the depletion of food stored in places Plant storage, which led to the weakening of the plant, which adversely affected the number of leaves/plant, which in turn affected the leaves area (m^2/m^2) of this plant. the case of repeated burning of the three times and their different dates, all these treatments resulted in a decrease in the number of leaves/plant as well as the leaves area of the plant (m^2/m^2) by (37.17, 71.17, 97 and 51.22%) to burn three times.

Table 1. Effect of the date and repeated of burning in the traits studied Plant water hyacinth growing in the site of the Faculty of Agriculture and Forestry University of Mosul for the season

Thoughtful adjective									
	Plant height / cm	Number of leaves	Leaves area (m^2/m^2)	Length of Inflorescence (cm)	Flowers number/ plant	Fresh weight of vegetative total (kg/m^2)	Dry weight of the vegetative total (kg/m^2)	Fresh eight of root (kg/m^2)	Dry weight of the root (kg/m^2)
Comparison (without burning).	38.10a	600 a	1.64 a	15.97 a	11 a	22.59 a	2.40 a	8.69 a	1.23 a
Burning one after month of comparison in day 12.07.2010.	37.63 a	615 a	1.84 a	14.80 ab	9 ab	19.63 ab	2.41 a	7.62 ab	1.40 a
Burn one after a month + burn again after 10 days of the first burn.	30.00 a	454 ab	1.16 b	13.17 ab	8 ab	13.79 c	1.74 b	7.95 ab	0.98 a
Burn one after a month of comparison + burn three after 20 days of the first burn.	14.73 b	377 bc	0.80 e	9.97 bc	6 cd	9.27 d	0.83 cd	5.94 b	0.77 a
Burning one after two months of comparison on day 12.08.2010.	32.63 a	339 bc	1.05 de	13.50 ab	9 ab	13.73 c	1.33 bc	6.80 ab	19.44 a
Burn one after two months of comparison + burn the second after 10 days of the first burn.	16.87 b	212 cd	0.41 f	6.10 cd	3 cd	4.61 ef	0.27 de	2.53 c	0.23 a
One burn after two months of comparison + burning three after 20 days of the first burn.	8.43 b	173 cd	0.47 f	3.87 de	3 cd	2.52 f	0.15 e	1.35 c	0.12 a
Burning one after three months of comparison on day 12.09.2010.	28.87 a	367 bc	1.26 b	13.97 ab	11 a	18.05 b	1.86 ab	7.73 ab	0.90 a
Burn one after three months of comparison + burn second after the 10 days of the first burn.	8.90 b	123 d	0.26 f	5.77 cd	5 bc	6.73 de	0.54 de	2.21 c	0.27 a
Burn one after three months of comparison + burn the second after 20 days of the first burn.	18.22 b	18 d	0.00 g	0.00 e	0.00 d	0.45 d	0.03 e	0.32 c	0.04 a

The values followed by similar letters are not significantly different from each other at the 5% probability level in each of the study factors and their interference.

Fresh and dry weight of vegetative total (kg/m^2)

The adjective of fresh and dry weight of vegetative total (kg/m^2) Plants of the water hyacinth table (1) were not significantly affected when you make the burning process once the deadline (12.07.2010) as well as at the date (12.09.2010) for the weight dry for vegetative total, the reason is that a burning process in the early stages of the experiment may cause damage to the vegetative total, but these plants soon quickly re-growth as a result of the growing vegetative by daughter plant or stolon in this period the plant active in produce many new growth Therefore it was able to reach the fresh weights of almost equal or equal to those plants not treated by burning. In the case of progress of the plant age and after one or two months of this burn, there is a significant effect for the two adjective and decrease by (39.22, 20.10 and 44.58%) for both the two adjective and both others time respectively. It may be because the burning process was carried out in the case of the plant is very activity where it had a large number of vegetative leaves so many, the process of burning in this period leads to significant damage to the total vegetation so that some of these plants, which was able to re-growth Were not able to form a total vegetative equal in these treatments were not treated by burn during the period of time the

experiment was harvested, which was less than the period during which the burning process was carried out at the beginning of the experiment. In the case of repeated burning of two times, three times and their different dates, all the treatments resulted in a significant decrease in the fresh and dry weight of the total vegetation of the water hyacinth plant (38.95, 79.59, 70.21, 27.5, 88.75, 77.5, 58.96, 88.84, 98.01 and 65.42, 93.75 and 98.75%) the burn two time and three time, for both the different s dates respectively, compared to non-burning plants.
Table 1 shows that the one-time burning process (12.07., 12.08. and 12.09.2010) did not significantly affect the adjective fresh weight of root total of the water hyacinth plant. In the case of repeated burning two times, the same table indicated that the process of burning at the date (22.07.2010) and twice did not significantly affect the fresh weight of the total root of the plants of the water hyacinth plant, but in the case increase plant age after burning after a month or two months and In the case of repeated burning, this process resulted in a significant decrease in the fresh weight of root of the plant by (70.89 and 74.57%) for both the two times respectively, compared to the plants that did not burn. While when the repeated burning three times, for different times in all the treatments, there was a significant decrease in the fresh weight of the root group of the Nile flower plants by (31.64, 84.46 and 96.32%) for the burning three times and different dates, respectively compared with the natural plants. It was also observed that there was no significant difference between recurrence of burning two and three times when compared between them. The dry weight of the root plant of the water hyacinth was not significantly affected by the various incineration factors and their different dates compared with the plants that were not treated with burning.

CONCLUSIONS

Delaying the time of burning is favoring for the control of water hyacinth plant.
More cover the results of present study confirmed that increasing the frequency of burning more than twice gave an excellent results for the controlling of this weed which reflexed in the reduction of all characteristics studied.

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