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Evaluation of Betanal Progress of herbicide effects on root morphological traits of sugar beet

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ABSTRACT: This study was conducted to evaluation of Betanal Progress OF herbicide on root morphological traits of sugar beet. The experimental design was factorial on the basis of randomized complete block with four replications. Treatments consisted of four different formulations of the herbicide Betanal Progress F (Iranian, Spanish, German and Chinese) with four different dosages (3, 4, 4.5 and 5 liters per hectare). Evaluated traits included fresh root weight, dry root weight, root diameter and root length. Result showed that formulation and dosage of herbicide had significant effect on traits at 5 or 1% statistical levels, also, Spanish formulations had the better result for diameter and length of root sugar beet and application of 4.5 and 5 liters per hectare treatments showed the best results in most traits, so, application of Spanish formulation and 4.5 liter per hectare proposed for sugar beet field.

***Keywords*:** Herbicide, Root, Morphological Traits, Control, Weed

INTRODUCTION

Sugar beet (Beta vulgaris L.) as an industrial crop is cultivated in 48 countries in the world, for a total land of over 9 million hectares. Sugar beet has slow growth rate in early season, which makes it vulnerable to weeds (Norris, 1996), thus the sugar beet yield reduction is estimated to be about 33-100% (Ghanbari Birgani et al., 1998 & 2000). Weeds compete with beet for space, light, moisture and nutrients and this will result in yield reduction. In North America Schweizer (1983) reported that late germinating weeds not only interfered with harvesting but also reduced yield. Early removal of weeds in beet is critical as Ammen et al (1986) suggested that the critical period for weed control in sugar beet is between four and eight weeks after crop emergence. A two year study of Rahbari and colleagues (2006) has shown that the combination of Safari herbicide and Betanal Progress AM is the best method to control the weeds in sugar beet seedbed preparation during autumn. In the combat between weeds and sugar beet, the sugar beet is the loser which leads to reduction of sugar beet harvest; Weeds also are a threat to cultivation and harvest operations (Hembree and Norris, 2005).The objective of this research was evaluating the Betanal Progress OF herbicide effects on root morphological traits of sugar beet.

MATERIALS AND METHODS

This study was conducted in field conditions for factorial experiment in a randomized complete block design with four replications. First factor included: Iranian, Spanish, German and Chinese and second factor was dosage of herbicide (3, 4, 4.5, 5 Liters per hectare). In this study, the cultivar was Shirin, Its growing period is 160-170 days. After planting, the irrigation done by leaking method. Data analysis was performed by using of SAS statistical program.

RESULTS AND DISCUSSION

Fresh weight of root: Based on the results of analysis of variance, formulation had significant effect on fresh weight of root but dosage and interaction between formulation and dosage didn't show statistical significant effect on fresh weight root (table 1). German formulation and china formulation showed highest (9867 gr/m^2) and lowest (6798 gr/m^2) fresh weight of root, respectively.

Table 1. means of square for studied traits

Source of Variation	Fresh weight	Dry weight	Root diameter	Root Length
Block	28998.71	4051.3	1.83	7.6
herbicide	363796.3**	18078.9**	27.22**	28.62**
dose	30519.25 ns	9256.4**	7.89**	23.29**
Herbicide*dose	13310.0ns	705.9ns	0.45 ns	2.33 ns
Error	17155.6	748.28	0.56	1.36
C.V	15.75	12.9	6.41	5.73

ns,* and ** show non-significant, significant at 5 and 1 % respectively

Dry weight of root*:* Herbicide formulation treatments and doses had significant effect on dry weight of root at 1% statistical level. Among formulation of the herbicide, Chinese and German herbicide with most root dry weight were analyzed in a group And dose consumption of 5 liters per hectare had the greatest impact on dry weight. The Iranian formula had the lowest effect.

Root diameter: Highest root diameter was observed in the formulation of Spanish (13/51 cm) and the lowest root diameter was observed in formulation of Iranian and Chinese, also application of 4.5 liter per ha showed highest means.

Root length: According to ANOVA, all treatments had significant effect on root length, So that highest root length was obtained by Spanish herbicide and consumed 4.5 liters per hectare dose treatment. Iranian formulation had lowest mean. Due to the fact that a lot of weeds can grow above the sugar beet canopy and reduce the amount of photosynthetic radiation reaching the crop, these weeds are stronger competitors compared to smaller weeds (Mittler et al., 2002). The optimum weeding period is between 4 and 6 weeks after 50 % cropemergence (Turner, 1992). Once the optimum weeding time has been reached yield may be depressed by 1.5 % for each day the crop is left unweeded, although sugar beet has some ability to recover from an early check (Montemuro et al., 1999). Generally, Spanish formulations had the better result for diameter and length of root sugar beet and application of 4.5 and 5 liters per hectare treatments showed the best results in most traits, so, application of Spanish formulation and 4.5 liter per hectare proposed for sugar beet field.

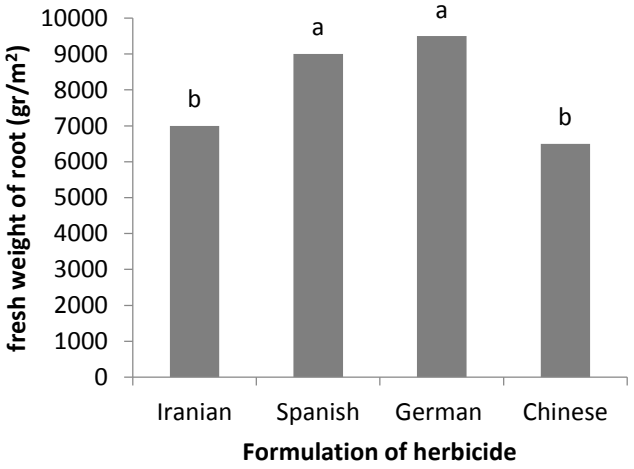

Figure 1 Effect of formulation treatments on fresh weight

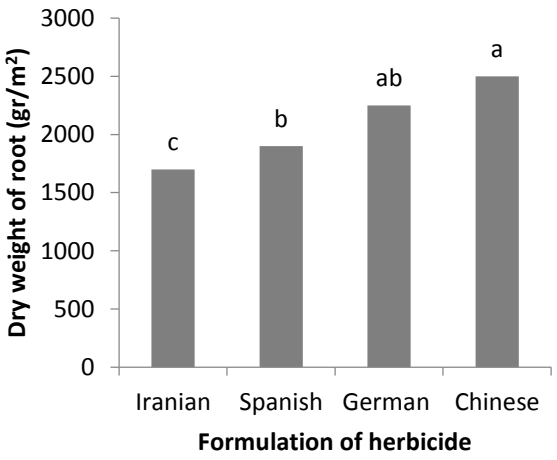

Figure 2 Effect of formulation treatments on dry weight

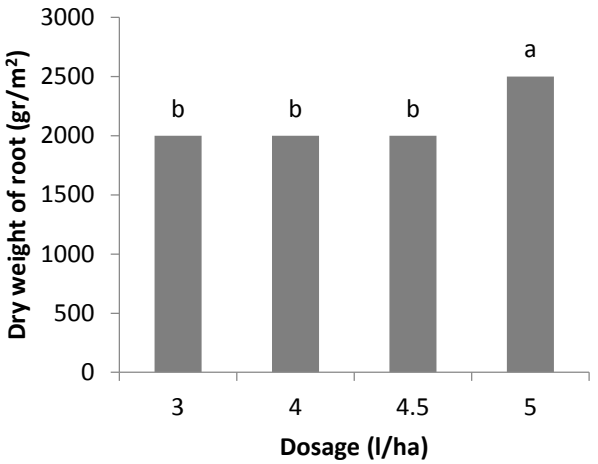

Figure 3. Effect of dosage treatments on dry weight

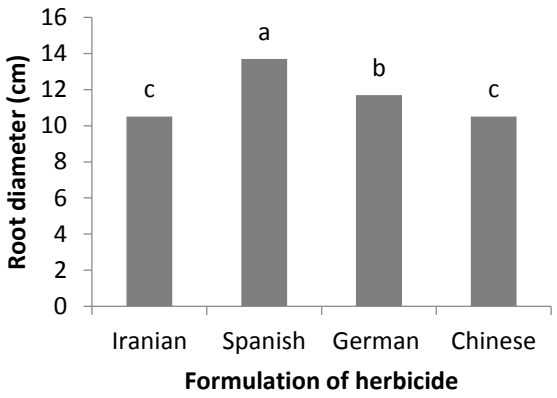

Figure 4. Effect of formulation treatments on root diameter

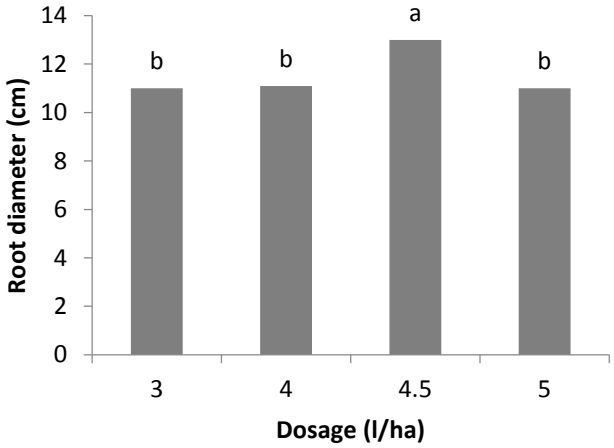

Figure 5. Effect of dosage treatments on root diameter

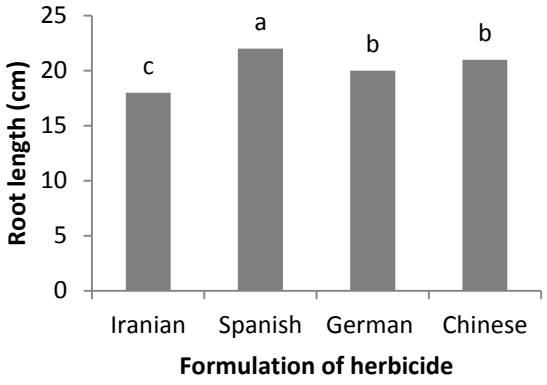

Figure 6. Effect of formulation treatments on root length

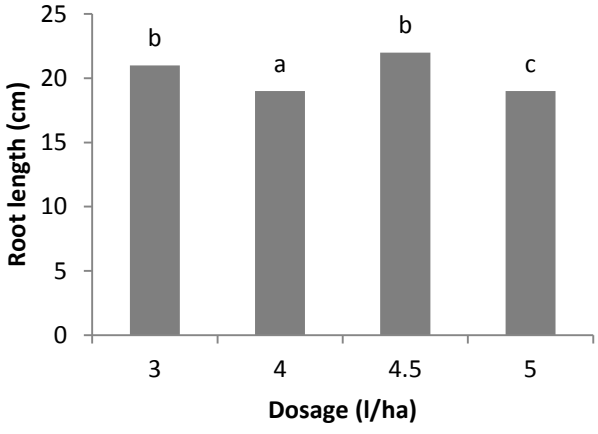

Figure 7. Effect of formulation treatments on root length

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