



Influence of Reducing Herbicides Rates in Washington Navel Orange Trees

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Abstract - This study was carried out during two successive seasons **2007** and **2008** on **25** years old Washington Navel orange trees *Citrus sinensis* L.; budded on sour orange root stock growing in a private orchard. To study influence of reducing herbicides rates in Washington Navel orange trees. The present investigation covered the effect of some herbicides with two rates for each (recommended dose and half of recommended dose + **4Kg urea /fed**) as well as hand hoeing on controlling weeds spread in citrus orchard. There was a significant depression in fresh weight of grass, broad leaved and total weeds with hand hoeing and herbicides treatments (Touchdown, Fluazifop-butyl and Pendimethalin with recommended and half recommended dose + **4Kg urea/fed**) when compared with unweeded treatment. the urea to a half recommended dose of herbicides gave the same effect of the recommended dose of herbicides to broad -leaved and grass weeds in citrus orchard and none showed any phytotoxic effect on the foliage of citrus plants. Pendimethalin **IL + 4 Kg urea / fed** treatment gave the highest yield / tree when compared with other herbicides treatments.

Keywords : *Herbicides, Weed, Washington Navel orange trees.*

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I. INTRODUCTION

I ncreasing the production of citrus is of great importance. This may be achieved by improving the agronomic practices among which weed control. Weeds on the other hand when found in citrus orchard might cause great problem because weeds compete directly with citrus trees for moisture and soil nutrients. Weed also represents a tool for transmission of pests, and even light in the case of climbing vines, which can easily cover young trees if left uncontrolled (Rao, 2000), (EL - Shamma, and Hassan, 2001), (O'-connell, and Snyder, 2004) and (Yang et al, 2007)

Nowadays, there is a shortage in farm labour and increase in the cost of hand labour and therefore, chemical control of weeds should be put into consideration. The objective of the present investigation was to study influence of reducing herbicides rates in Washington Navel orange Trees by additional of urea to reduce the rate of used herbicides to give the same effect on weeds and less pollution environment. In the end of experiment, the best treatments which showed good control of weeds with regard to their economical cost, will be recommend to use in citrus orchard (Johannes, et al. 2004) and (Gravena, et al 2009).

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II. MATERIAL AND METHODS

The present study was performed during two successive seasons. 2007 and 2008 on 25- years old Washington Navel orange tree *Citrus sinensis* L.; budded on sour orange root stock growing in a private orchard. The trees were planted in clay loam soil at 5 × 6 meters a parts. The Orchard was under the basin irrigation system. All the experimental trees were treated a like for all agricultural practices except for the purpose of this study.

The experiment included the following treatments

- 1- Touchdown (Glyphosate – trimesium : N-phosphonomethyl glycine trimethyl – sulphonium at 2L/fed)
- 2- Touchdown (Glyphosate – trimesium : N-phosphonomethyl glycine trimethyl – sulphonium at 1L+ 4 Kg urea /fed.)
- 3- Fluazifop- butyl (Fusilade) butyl 2-[4 – (5-trifluoromethyl -2- pyridyloxy) Phenoxy] propionate at 2L /fed.
- 4- Fluazifop –butyl (Fusilade) butyl 2-[4 - (5-trifluoromethyl - 2 -Pyridyloxy) phenoxy] propionate at 1L+4Kg urea / Fed.
- 5- Pendimethalin (Stomp 50%), N-(1-ethylpropyl) - 3, 4 –dimethyl – 2, 6- dinitrobenzamine at 2 L / Fed.
- 6- Pendimethalin (Stomp50%), N-(1-ethylpropyl) -3,4 – dimethyl - 2,6- dinitrobenzamine at 1L + 4 Kg urea /fed.
- 7- Hand hoeing : Plots were hoed two times a year the first cultivation was carried out in early December, to a depth of about 20 cm, the second was carried out in early July to a depth of about 10 cm.
- 8- Control : where weeds were left without control to compare the effect of different weed control treatments on the original weed population and to confirm the density of different kinds of weeds.

The spray volume in herbicidal Treatments was 400 L/ feddan all chemical weed control treatments were applied at July of each season.

For each treatment, four replicates were used, each replicate consisted of one tree, and thus we had a total of 32 trees.

The experimental trees were divided into uniform groups according to the tree vigor and productivity. Each group contained a number of treatments and the completely randomized block design was used.

Weeds were hand pulled from a square meter from the middle part of each treatment at 6 weeks and 12 weeks after application of herbicides.

a) *Weeds were classified to three groups*

- 1- Grass weeds 2- Broad –leaved weeds
- 3- Total weeds

Fresh weight per 1m² of each group of weeds was determined.

At the commercial harvesting time (approximately the last week of December) in each season the yield was estimated on the basis of number and weight of fruits per tree.

Data obtained in both season were subjected to the proper statistical analysis according (Snedecor and Cochran, 1990). Treatments means were compared using Duncan's multiple range test (Duncan, 1995) at the 5% level of probability.

III. RESULTS AND DISCUSSION

a) *Effect of weed control treatments on weed population*

The dominant weed species encountered in the experimental plots during the two seasons could be arranged in a descending order as follows:

- a) Annual broad – leaved weeds included. Small infestation of pigweed (*Amaranthus* sp.) purslane weed (*portulaca oleraceae*, L), sea beat (*Beta vulgaris*, L) Small nettle (*Urtice urens*, L), yellow sorrel (*Oxalis corniculata*, L) and nettle leaved (*Chenopodium murale*, L).
- b) Annual grasses, included beard grass (*Polypogon monspeliensis* L.) and junglerice (*Echinochloa colonum* L.) link.

Fresh weight of broad – leaved grasses and total weeds in gm per square meter as affected by different weed control treatments, after 6 and 12 weeks from application of herbicides in seasons 2007 and 2008 is presented in Fig. (1).

i. *Broad – leaved weeds (g/m²)*

Data recorded in Fig. (1) revealed that fresh weight of broad – leaved weeds was significantly affected by different weed control treatments. The results also indicated that hand hoeing (twice) treatment gave the best weed control compared with other treatments in both 2007 and 2008 seasons.

Touchdown 2L /fed. treatment as well as touchdown 1L + 4 Kg urea/fed. treatment gave the highest weed control compared with other herbicidal treatments and decreased fresh weight of broad – leaved weeds at 6 and 12 weeks after application of treatments in both seasons.

The results also indicated that pendimethalin 1L+ 4Kg urea/fed. reduced fresh weight of broad-leaved weeds compared to control treatment by about 43.9, 29.8, 43.2 and 38.6 % at 6 and 12 weeks after

application in 2007 and 2008 seasons respectively. These results are in harmony with (Kalita and Bhattacharyya, 1995). They reported that application of Glyphosate at 2Kg /ha three times at 60 day intervals and the integrated practice of hoeing followed by Glyphosate at 1 Kg /ha complemented by paraquat at 0.25 Kg / ha + 0.2 % urea controlled weeds in lemon, is very effectively .

ii. *Grass weeds (g/m²)*

Data recorded in Fig. (1, 2) revealed that fresh weight of grass weeds was significantly by different weed control treatments. The results also indicated that hand hoeing treatment was very effective in controlling grassy weeds after 6 and 12 weeks from application in both seasons and showed the highest efficiency in decreasing fresh weight than control treatment by 89.7, 93.7, 94.2 and 94.3% respectively . The results also indicated that Touchdown 1L+ 4 Kg urea /fed. Treatment gave the best weed control compared with other herbicidal treatments and decreased fresh weight of grass weeds at 6 and 12 weeks after application of treatment in both seasons. This treatment reduced fresh weight of grass weeds compared to control treatment by about 64.9, 74.9 and 80.7% at 6 and 12 weeks after application in 2007 and 2008 seasons, respectively. These results are agreement with (Stephen, et al. 2000), (Liu and Connell, 2003) and (Koloren and Uygur, 2006).

iii. *Total weeds (g/m²)*

Generally, results in Fig.(1,2) showed that all weed control treatment statistically decreased fresh of total weeds grown in citrus orchard as compared to unwedded treatment. Which recorded the maximum value of fresh weight of total weeds were 1132.5, 1350.0, 1977.5 and 2507.5 (g/m²).

With regard to application urea to herbicides data indicated that application of urea to a half recommended dose of herbicides reduced the cost of weed control and gave the same effect of the recommended dose of herbicides to broad – leaved and grass weeds in citrus orchard and none showed any phytotoxic effect on the foliage of citrus plants.

This is safety method of weed control in citrus orchard. These results are in agreement with obtained by (Kalita and Bhattacharyya, 1997) found that paraquat at 0.25Kg /ha + 0.2 % urea controlled weeds in lemons very effectively and resulted in improved flowering , fruiting and fruit yield in comparison to other weed management systems.

b) *Effect of weed control treatments on tree production*

i. *Number of fruits per tree*

Results in Fig. (3) indicate that all weed control induced a significant increase in number of fruit per tree as compared with control treatment, which gave the lowest values in the two seasons.

ii. *Fruit weight*

Fruit weight Fig. (3) was greatly affected by different weed control treatments. The lowest fruit weight was obtained from control treatment which recorded 102 and 101 at seasons 2007 and 2008 respectively. But pendimethalin at 2L /fed. Treatment and pendimethalin 1L+ 4Kg urea /fed. Increased averages of fruit weight compared with other herbicides treatments. This was true in the two seasons.

iii. *Yield (weight/Kg per tree)*

Yield tree as affected by different weed control treatments was recorded in Fig.(3).

The results showed clearly that, the different weed control treatments were great enough to reach the significant level at 5%. The highest yield per tree was produced by hand hoeing twice the increase in yield of tree due to these treatment amounted to 83.8 and 85.0 % in 2007 and 2008 seasons respectively compared to control treatment. From the results of two seasons it could be noticed that fusilade at 2L /fed. treatment and fusilade at 1L + 4Kg urea /fed treatments produced 46.00 Kg /tree and 47.97 Kg /tree at 2007 season it shows that no significant differences between them as well as touchdown at 2L/fed. and touchdown 1L + 4 Kg urea /fed treatments produced 41.56 Kg /tree and 43.49 Kg /tree at the 2008 season. But pendimethalin 1L + 4Kg urea /fed treatment (which produce 59.62Kg /tree and 64.72 Kg/tree at the 2007 and 2008 respectively), gave the highest yield /tree when compared with other herbicides treatments.

This superiority in tree productively may be due to the accumulative effect of weed control treatment that resulted better eradication and hence eliminated dangerous competitive weed grasses, broad – leaved and total weeds) these results are in harmony with (Hassan and Abd El- Naby, 1998) and (Hassan et al, 2006) they reported that all weed control treatments gave high significant increase in the fruit weight and yield as compared with control treatment.

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Figure Captions

Fig. 1: Effect of weed control treatments on fresh weight of weeds (g/m²) in season 2007.

Fig. 2: Effect of weed control treatments on fresh weight of weeds (g/m²) in season 2008.

Fig. 3: Effect of weed control treatments on tree productivity during 2007 and 2008 seasons.

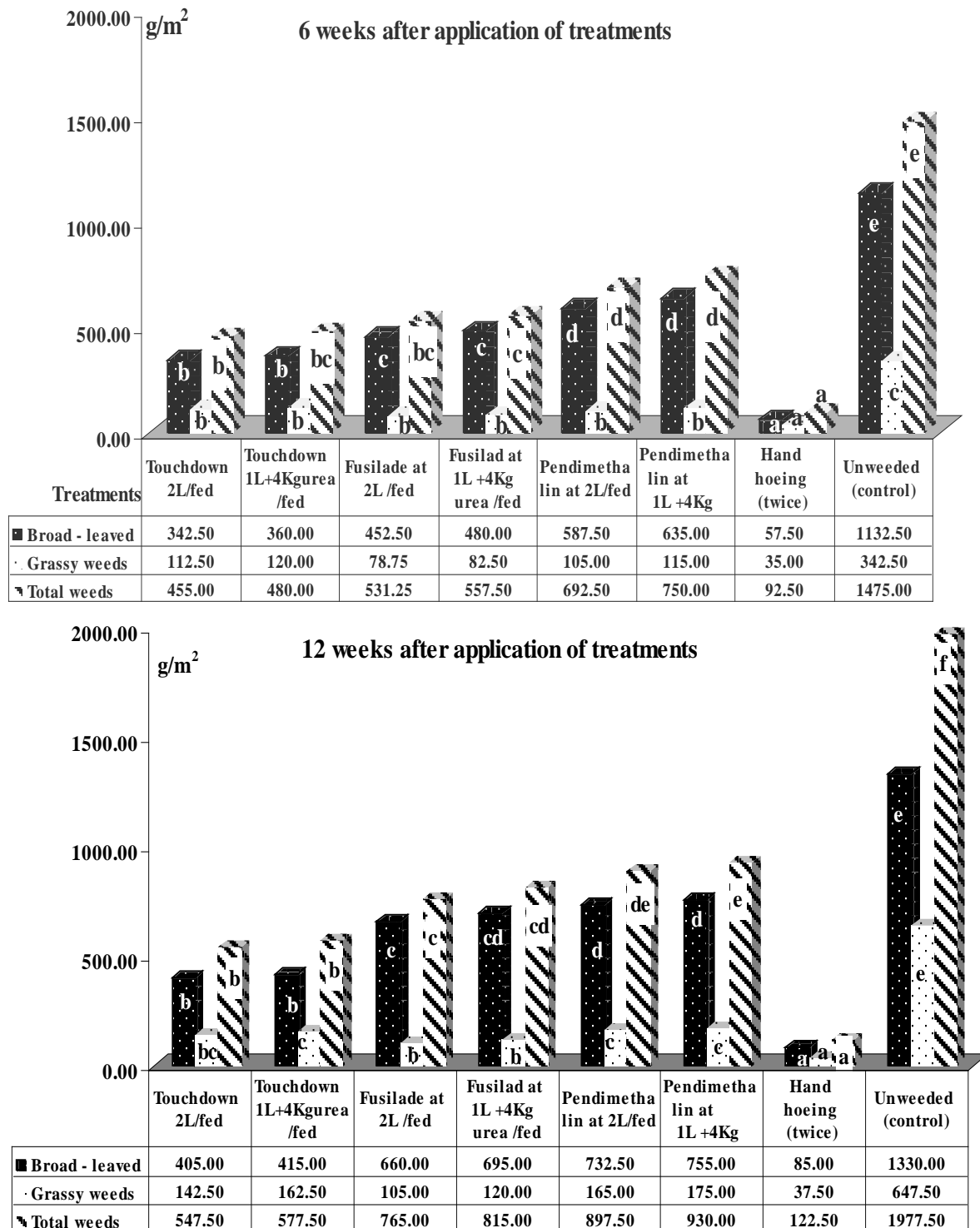


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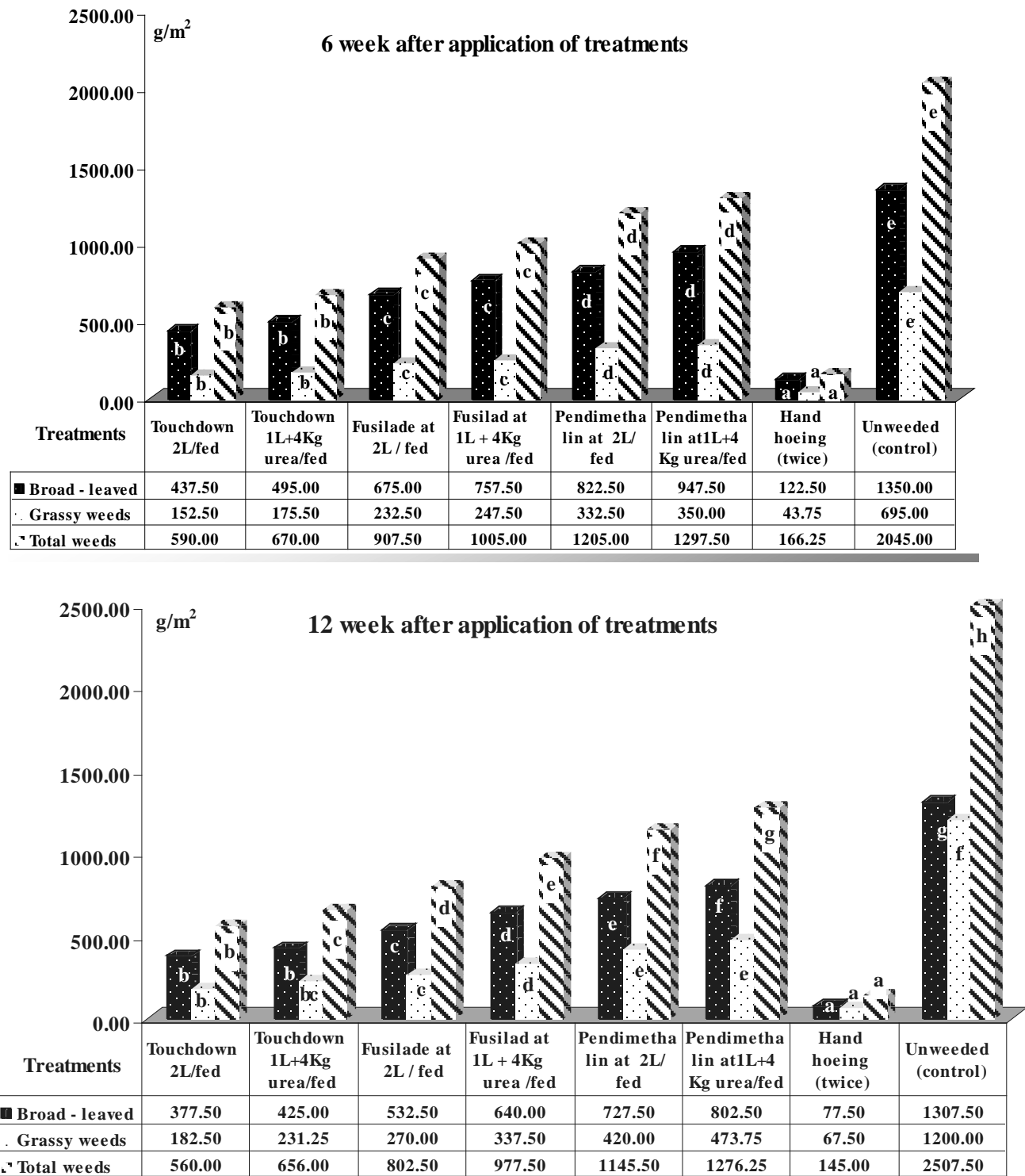


Fig. 2 : Effect of weed control treatments on fresh weight of weeds (g/m²) in season 2008.

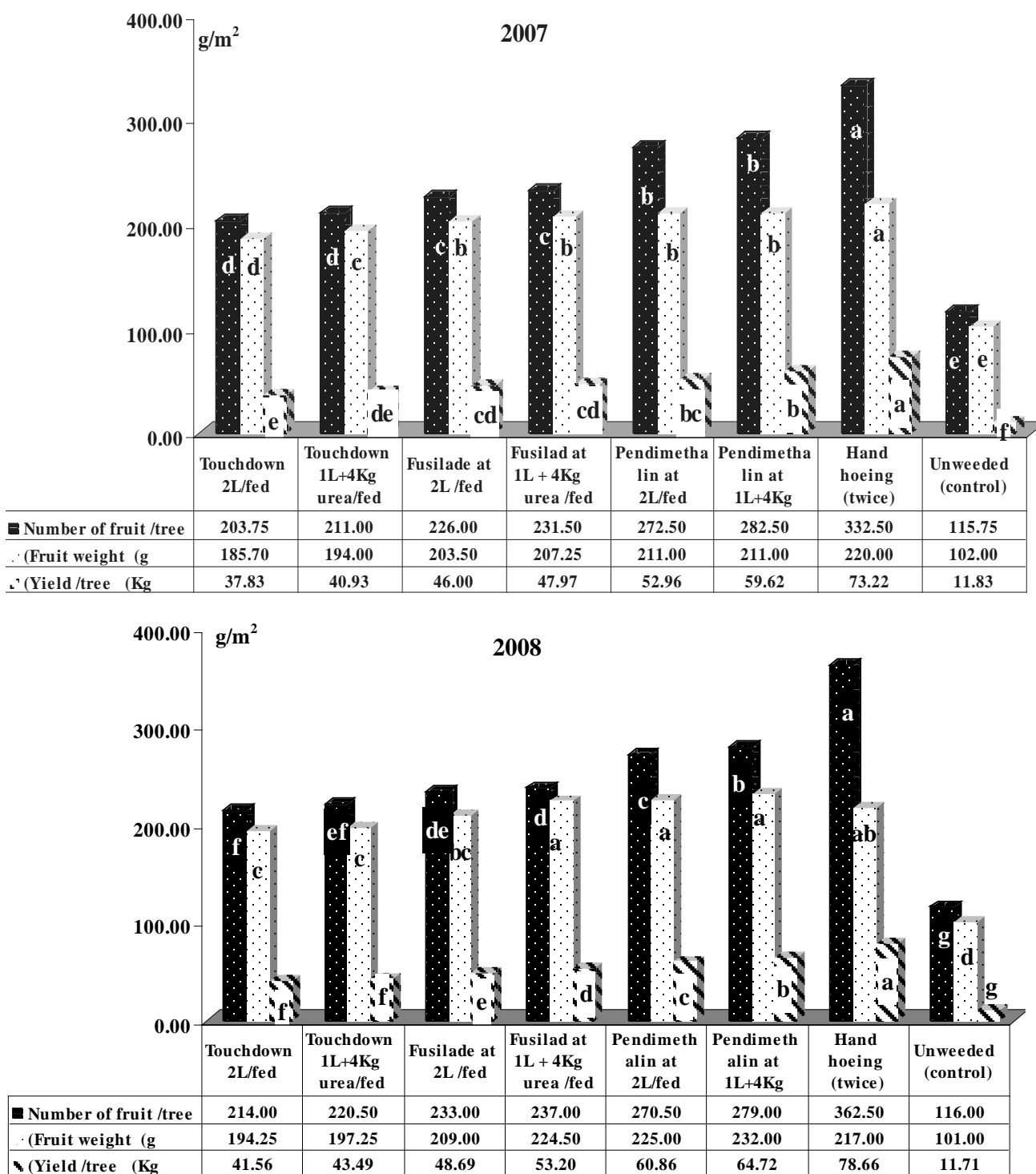


Fig.3 : Effect of weed control treatments on tree productivity during 2007 and 2008 seasons.