



## Impact of herbicides Imazethapyr (Pursuit) and Oxyfluorfen (Goal) on weed control and yield of groundnut (*Arachis hypogaea* L.)

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### ABSTRACT

Trials were initiated in 2007 to evaluate systems of weed management in peanut using herbicides. Two trials were conducted at Sudan University of Science and Technology, College of Agricultural Studies and Research Farm of University of Khartoum, Faculty of Agriculture, Shambat, to evaluate the efficacy of imazethapyr and oxyfluorfen herbicides for weed control at different rates, tolerance, and yield of the crop. The imazethapyr was used at rates of 0.175, 0.25, and 0.5 L/fed, for and oxyfluorfen at rates of 0.25, 0.5 and 1.0 L/fed.

Moreover, the two products were also combined at low, medium and high rates. The results showed significant differences at medium and high rates of the two herbicides combination and at hand weeding as compared to the unweeded control in the variety

Medani and Sodari for growth and yield components. The highest reduction in yield was found in unweeded control, it was 49.89% in season 2007/2008 and 45.31% in season 2008/2009. Significant differences were also observed in number of pods per plant, 100 pod weights, in comparison with the unweeded control

### Indexing terms/Keywords

Pursuit; Imazethapyr; weed management; *Arachis hypogaea* L; Oxyfluorfen (Goal).

### Academic Discipline And Sub-Disciplines

Weeds science

### SUBJECT CLASSIFICATION

Chemical control of weeds

### TYPE (METHOD/APPROACH)

Laboratory and Field experiments

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## INTRODUCTION

Groundnut (*Arachis hypogaea* L.) belongs to the family Fabaceae (Gregory *et al.*, 1973). It is the 13<sup>th</sup> most important food crop and 4<sup>th</sup> most important oil seed crop of the world. This crop is known throughout the world by different names: peanut, earthnut, monkeynut and goobers. It is grown in nearly 100 countries. The origin of groundnut is South America, it dates back to 350 BC (Hammons, 1994 and Wiess, 2000). The main producing countries are China, India, Nigeria, USA, Indonesia and Sudan (Mondal *et al.*, 2006). In addition it is widely grown in many countries such as Myanmar, Vietnam, Senegal, the Democratic Republic of Congo, Chad, Burkina Faso, Zimbabwe, Mali, Mozambique, Uganda and Tanzania (Shiferaw *et al.*, 2004).

Groundnut is grown primarily as an oil seed crop and most of the produce is used for oil production (Singh, 1982). It is consumed directly in processed food and snacks as a valuable source of protein, energy, minerals, oil, meal and confectionery products (AbuAssar *et al.*, 2008). Groundnut oil is composed of mixed glycerides and contains a high proportion of unsaturated fatty acids, in particular, oleic (50-65%) and linoleic (18-30%) (EINaim *et al.*, 2010).

Sudan is one of the major groundnut producing countries. The crop is an important source for foreign exchange in the country, because it is a cash crop, and it plays an important role in the economy of the Sudan (MANR, 1985). Over 97.6% of the world groundnut area (21.7 m ha) is grown by developing countries and total production is about 95.5%, with average yield of 1522 kg/ha. According to FAO statistics production is concentrated in Asia and Africa (FAO, 2006).

Beside insect pests and diseases, a serious problem facing agriculture in Sudan is the heavy infestation of weeds. Weeds cause serious losses in all agricultural schemes in Sudan especially the irrigated ones such as Gezira scheme where cost of weed removal can reach 45% of the total cost of production (Mohamed, 1995). Weeds reduce crop yield by interfering with crop growth. This interference includes competition for nutrients, light and water (Akobundu, 1987). Moreover, weeds deplete soil fertility as well as helping spread of pests and diseases (Robert, 1982).

## MATERIALS AND METHODS:

Field experiments were conducted at the Research Farm in the College of Agricultural Studies, Sudan University of Science and Technology for the seasons 2007/2008 and 2008/2009. The experiment was carried out to evaluate performance of the herbicides namely; imazethapyr and oxyfluorfen for weed control in groundnut. The effect of herbicides on yield and yield components were determined and assessed.

The soil contains an average of 29% clay, 12% silt and 29% sand. The pH-value was 7.9 and CEC (cation exchange capacity) was 61 m mol /100g.

The experimental land was ploughed, harrowed, leveled and then ridged in north south directions with 70 cm between ridges, plot size was 4x3.5 m.

Fertilizer in form of NPK was added to soil at a rate of 50 kg/fed. Treatments were arranged in split plot design with four replicates. Groundnut cultivars namely, Medani and Sodari both seasons.

The seeds were treated by thiram at a rate of 3 g/1kg seeds to avoid fungal infection. The two varieties were sown in the 16<sup>th</sup> and 17<sup>th</sup> June of 2007 and 2008 respectively. Three seeds per hole were sown at 15 cm between holes and 70 cm between ridges. Only four rows were planted in each plot and the fifth one was left without sowing to avoid herbicide movement through the plots.

The herbicides oxyfluorfen (Goal 24%) at 0.25, 0.5 and 1.0 L/fed. Imazethapyr (Pursuit 10%) at 0.175, 0.25 and 0.5 L/fed. The herbicides combination Goal + Pursuit, at 0.25 + 0.175, 0.5 + 0.25 and 1.0 + 0.5 L/fed were applied as aqueous sprays at a volume rate of 400/l fed immediately groundnut sowing, using knapsack sprayer.

The experiment comprised of 88 plots (eleven treatments for each replicate for the two cultivars).

The weeded and unweeded control was included for comparison. The weeded control received 4 hands weeding during the whole season while the untreated plots kept weedy for the whole season.

Irrigation was done at two weeks interval. The insecticide dursban was applied against termite at rate of 6.5 ml/L. Fungicide Baleton was used for cercospora leaf spot in groundnut leaf.

## Data Collection:

### Weeds

Weeds were assessed as the number of weeds in 1 m<sup>2</sup>, one month after sowing. The weeds were cut in an area of 1 m<sup>2</sup> each plot to weed fresh weight and then kept in paper bags to dry under room temperature for 7 days and then transferred to oven at 70 °C for 48 hours and then weighed to determine weed biomass.

Weed control was calculated as percentage according to the following equation:

$$\text{Control \%} = \frac{\text{Number of weeds in untreated plot} - \text{number of weeds in treated plot} \times 100}{\text{Number of weeds in the untreated plot}}$$

### Weed index



Weed index was calculated by using the formula given by Gill and Vijaykumar:

$$\text{Weed index} = \frac{x-y}{x} \times 100$$

Where:

X= pod yield in weed free plot

Y= pod yield in treated plot

### Crop

Five plants of each variety were randomly selected from the two central rows to determine the following:

Number of branches per plant

Number of pods per plant

## RESULTS & Discussion

### Effect of herbicides treatment on weed control

#### Effect on control percentage:

In both seasons and for the two cultivars weed control percentage as expressed by the mean of each herbicide and the combination of the two herbicides showed an excellent weed control. The combination of Goal and Pursuit displayed excellent weed control in Sodari (84-87%) for the season 2007/2008 and 2008/2009 respectively, however in Medani resulted in good weed control (79-73%) in season 2007/2008 respectively (Figure 1, Figure 2).

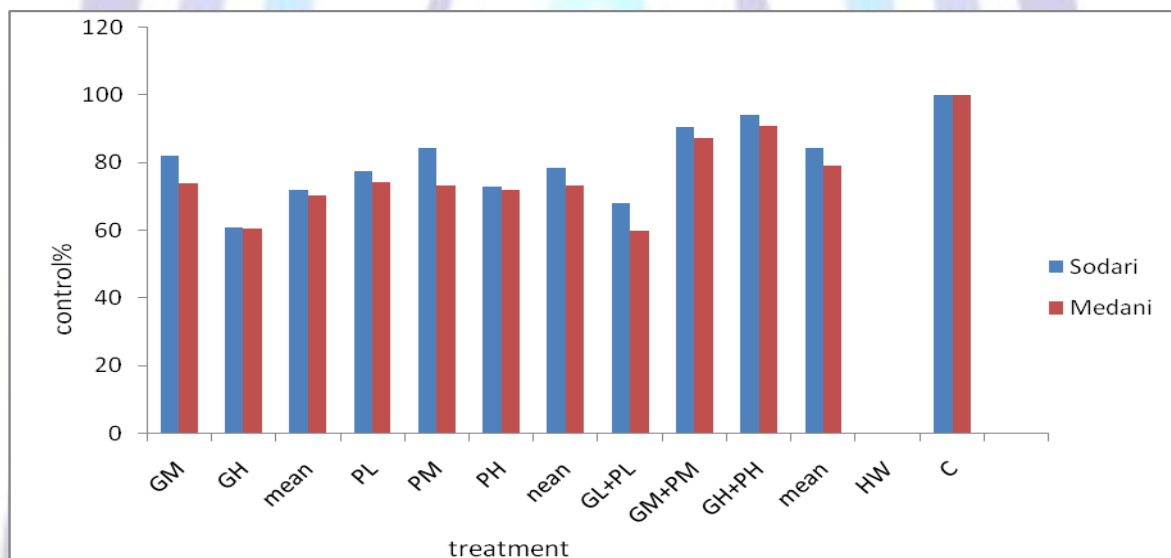
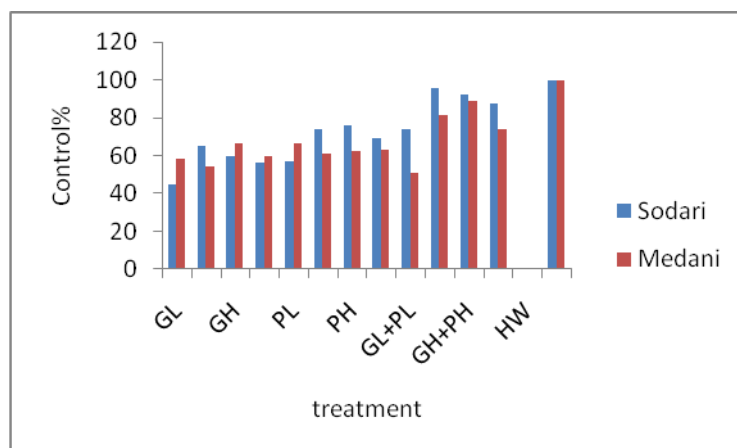


Fig. 1: Effect of herbicides treatment on weed control percentage 2007/2008





**Fig. 2: Effect of herbicides treatment on weed control percentage 2008/2009**

Medium rates of the combination of the two herbicides combination showed the maximum control of weeds as compared to single herbicides treatment with the exception the low dose of the combination in the two seasons.

**Effect on weed biomass:**

Concerning dry weight per meter square single herbicides treatments and combination of the two herbicides resulted in significant and persistence control of weeds for both cultivars of groundnut Sodari and Medani in seasons 2007/2008 and 2008/2009 as compared to the un weeded control. (Table1).

**Table 1: Effect of treatments on weed biomass g /m<sup>2</sup>**

| Treatment | weed biomass<br>g /m <sup>2</sup> |                               |                                |                               |
|-----------|-----------------------------------|-------------------------------|--------------------------------|-------------------------------|
|           | Season 2007-2008                  |                               | Season 2008-2009               |                               |
|           | Sodari                            | Medani                        | Sodari                         | Medani                        |
| GL        | 75.57 ( 7.83 <sup>b</sup> )       | 90.55 (4.48 <sup>bcd</sup> )  | 151.3 (11.22 <sup>abcd</sup> ) | 138.3(13.42 <sup>ab</sup> )   |
| GM        | 21.23 ( 5.69 <sup>bcd</sup> )     | 65.95 ( 4.18 <sup>bcd</sup> ) | 136.0(11.44 <sup>abcd</sup> )  | 129.5(11.29 <sup>abcd</sup> ) |
| GH        | 27.97( 7.52 <sup>bc</sup> )       | 43.60 ( 3.65 <sup>cd</sup> )  | 131.0(11.40 <sup>abcd</sup> )  | 130.3(10.79 <sup>abcd</sup> ) |
| PL        | 82.50 ( 6.17 <sup>bcd</sup> )     | 94.05 ( 7.04 <sup>bcd</sup> ) | 143.0(12.34 <sup>abcd</sup> )  | 163.3(13.34 <sup>ab</sup> )   |
| PM        | 20.10 (4.66 <sup>bcd</sup> )      | 35.88( 5.60 <sup>bcd</sup> )  | 120.8(12.00 <sup>abcd</sup> )  | 142.8(11.99 <sup>abcd</sup> ) |
| PH        | 26.38 (4.66 <sup>bcd</sup> )      | 28.25 ( 4.18 <sup>bcd</sup> ) | 110.5(10.29 <sup>bcd</sup> )   | 180.3(11.98 <sup>abcd</sup> ) |
| GL+PL     | 26.83(7.58 <sup>bc</sup> )        | 51.28 (7.02 <sup>bcd</sup> )  | 128.0(11.15 <sup>abcd</sup> )  | 137.3(12.78 <sup>abc</sup> )  |
| GM+PM     | 19.46 (4.13 <sup>bcd</sup> )      | 21.11 ( 3.22 <sup>d</sup> )   | 121.5(10.14 <sup>bcd</sup> )   | 118.3(8.72 <sup>cd</sup> )    |
| GH+PH     | 15.50 (3.98 <sup>bcd</sup> )      | 10.15 (3.35 <sup>d</sup> )    | 105.0(9.81 <sup>bcd</sup> )    | 97.0(8.13 <sup>d</sup> )      |
| HW        | 0                                 | 0                             | 0                              | 0                             |
| C         | 182.7 (11.39 <sup>a</sup> )       | 207.6 ( 12.86 <sup>a</sup> )  | 172.3(16.57 <sup>a</sup> )     | 183.3(14.80 <sup>a</sup> )    |
| CV%       | 7.39%                             |                               | 2.31%                          |                               |
| SE±       | 1.21                              |                               | 1.24                           |                               |

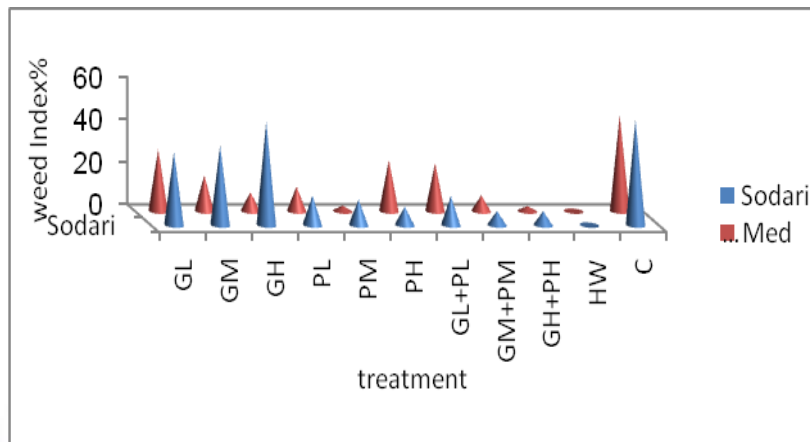
Means within columns followed by the same letters are not significantly different (Duncan's multiple range test) at p≥0.05

The data in the bracts were transformed.

- |    |  |       |                                       |
|----|--|-------|---------------------------------------|
| GL | ≡ Goal at low dose (0.25 l /fed)       | GL+PL | ≡ Goal + Pursuit (0.25 +0.175 l /fed) |
| GM | ≡ Goal at medium dose (0.5 l /fed)     | GM+PM | ≡ Goal + Pursuit (0.5 +0.25 l /fed)   |
| GH | ≡ Goal at high dose (1.0 l /fed)       | GH+PH | ≡ Goal + Pursuit (1.00 +0.5 l /fed)   |
| PL | ≡ Pursuit at low dose (0.175 l /fed)   | HW    | ≡ Hand weeding                        |
| PM | ≡ Pursuit at medium dose (0.25 l /fed) | C     | ≡ control (un treated)                |
| PH | ≡ Pursuit at high dose (0.5 l /fed)    |       |                                       |

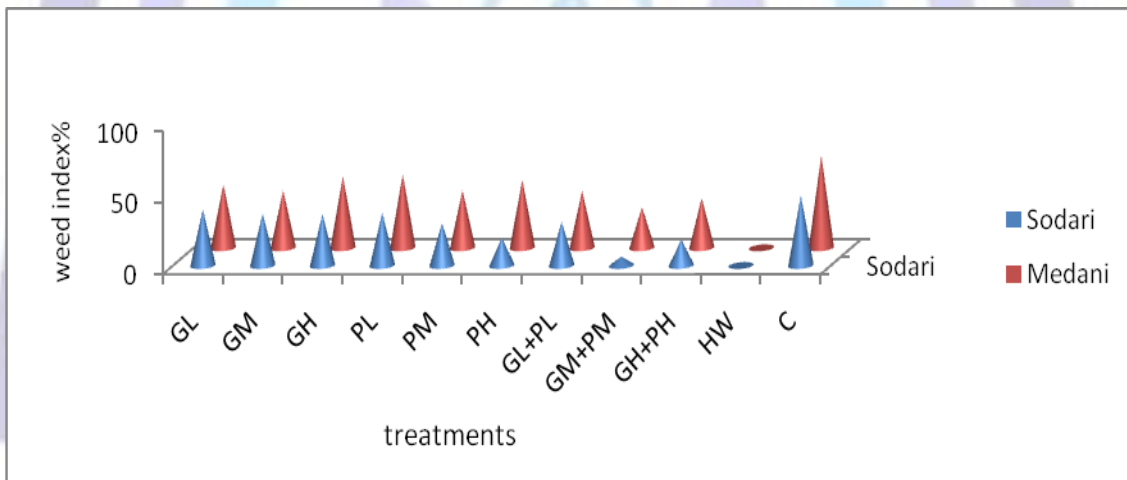
### Effect on weed index:

In season 2007/2008 the results indicate that, the un treated weed control recorded higher weed index 49.89 and 45.31% for Sodari and Medani cultivars respectively, followed by the single dose of herbicide Goal at high rates 48.92% and 29.33% at low rate of Sodari and Medani cultivars respectively. The combination of the two herbicides at the medium and high rates recorded the lowest weed index 6.62% and 6.54% for the cultivars Sodari, and 7.52%, 2.43% for the Medani respectively(Figure3)



**Fig. 3: Effect of treatments on weed index season 2007/2008**

In season 2008/2009, the similar results of weed index occurred in the two cultivars. The highest weed index obtained by untreated weed control 49.33 and 64.95% for Sodari and Medani cultivars respectively, followed by the single dose of herbicide Goal at low rate 39.49 and 50.18% of herbicide at high rate. The hand- weeded plots recorded weed index lowest weed (0.0). (Figure 4).



**Fig. 4: Effect of treatments on weed index season 2008/2009**

### Effect of weed control treatments on growth and yield components of groundnut

#### Effect on number of branches per plant

Table 2 showed the number of branches per plant. In season 2007/2008 Goal and Pursuit treatments had no significant difference in number of branches per plant of cultivar Sodari. However, in second season 2008/2009 the herbicides combination showed significant difference in number of branches per plant in comparison with other treatments. In season 2007/2008 the combination of herbicides at medium and high rates and weed free treatments attained number of branches per plant significantly different from that of the unweeded control Goal at medium rate, Pursuit at high rate, Goal in mixture with Pursuit at different rates and weed free treatments gave number of branches per plant of cultivar Medani significantly different from that of un treated control in season 2007/2008 However, only herbicides combination at medium and high rates and weed free treatments showed significant difference in number of branches per plant compared with other treatments .(Table 2)

**Table 2 Effect of treatments on number of branches per plant of groundnuts Varieties (Sodari and Medani)**



|       | Season 2007-2008     |                      | Season 2008-2009      |                        |  |
|-------|----------------------|----------------------|-----------------------|------------------------|--|
|       | Sodari               | Medani               | Sodari                | Medani                 |  |
| GL    | 5.25 <sup>bcd</sup>  | 4.63 <sup>cd</sup>   | 4.85 <sup>defg</sup>  | 6.25 <sup>abcdef</sup> | Means within columns followed by the same letters are not significantly different (Duncan's multiple range test) at p ≥ 0.05 |
| GM    | 5.80 <sup>abcd</sup> | 7.63 <sup>ab</sup>   | 4.63 <sup>defg</sup>  | 6.30 <sup>abcdef</sup> |  |
| GH    | 5.78 <sup>abcd</sup> | 5.00 <sup>bcd</sup>  | 5.95 <sup>bcdef</sup> | 6.85 <sup>abcd</sup>   |  |
| PL    | 5.75 <sup>bcd</sup>  | 4.63 <sup>cd</sup>   | 4.15 <sup>fg</sup>    | 5.23 <sup>cdetg</sup>  |  |
| PM    | 6.08 <sup>abcd</sup> | 4.58 <sup>cd</sup>   | 4.45 <sup>efg</sup>   | 5.98 <sup>bcdef</sup>  |  |
| PH    | 6.23 <sup>abcd</sup> | 7.65 <sup>ab</sup>   | 5.35 <sup>cdefg</sup> | 6.60 <sup>abcde</sup>  |  |
| GL+PL | 5.83 <sup>abcd</sup> | 6.43 <sup>abcd</sup> | 5.13 <sup>cdetg</sup> | 6.10 <sup>abcdef</sup> |  |
| GM+PM | 6.08 <sup>abcd</sup> | 7.95 <sup>a</sup>    | 5.88 <sup>bcdef</sup> | 7.40 <sup>abc</sup>    |  |
| GH+PH | 6.40 <sup>abcd</sup> | 6.83 <sup>abc</sup>  | 6.55 <sup>abcd</sup>  | 6.83 <sup>abcd</sup>   |  |
| HW    | 6.43 <sup>abcd</sup> | 8.23 <sup>a</sup>    | 7.95 <sup>ab</sup>    | 8.33 <sup>a</sup>      |  |
| C     | 4.58 <sup>cd</sup>   | 3.95 <sup>d</sup>    | 3.18 <sup>g</sup>     | 4.23 <sup>efg</sup>    |  |
| CV%   | 25.55                |                      | 23.14                 |                        |  |
| SE±   | 0.78                 |                      | 0.6                   |                        |  |

n's multiple range test) at p ≥ 0.05

### Effect on number of pods per plant

Pursuit at medium and high rates, herbicides combination at different rates and weed free check treatments gave on number of pods per plant of cultivar Sodari significantly higher than that of the un weeded control in season 2007/2008. However, all treatments displayed significant different in number of pods per plant of Medani cultivar, in the same season (Table 3). In season 2008/2009 Sodari cultivar, treated with herbicides combination at medium and the high rates and weed free treatments showed number of pods per plant significantly higher than that of the unweeded control. At the same time Medani cultivar showed there was no significant difference in number of pods per plant between herbicides treatments and the weeded control. Pursuit at medium and the high rates, Goal and Pursuit combination at different rates and weed free treatments displayed number of pods per plant significantly higher than that of the weedy checked (Table 3).

**Table3: Effect of treatments on number of pods per plant of groundnuts Varieties (Sodari and Medani)**

| Treatment | Number of pods / plant        |                               |                                |                               |
|-----------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|
|           | Season 2007-2008              |                               | Season 2008-2009               |                               |
|           | Sodari                        | Medani                        | Sodari                         | Medani                        |
| GL        | 15.38 (3.21 <sup>abcd</sup> ) | 7.78 (2.40 <sup>cd</sup> )    | 5.43 (2.37 <sup>efg</sup> )    | 7.23 (2.73 <sup>cdefg</sup> ) |
| GM        | 19.53 (3.89 <sup>abcd</sup> ) | 11.20 (3.39 <sup>abcd</sup> ) | 7.30 (2.66 <sup>cdefg</sup> )  | 9.75 (3.07 <sup>bcdef</sup> ) |
| GH        | 15.0 (4.06 <sup>abc</sup> )   | 13.75 (3.65 <sup>abcd</sup> ) | 8.65 (3.08 <sup>bcdef</sup> )  | 8.80 (2.99 <sup>bcdef</sup> ) |
| PL        | 15.00 (3.7 <sup>abcd</sup> )  | 5.80 (2.72 <sup>bcd</sup> )   | 6.03 (2.68 <sup>defg</sup> )   | 5.30 (2.39 <sup>efg</sup> )   |
| PM        | 21.00 (4.50 <sup>ab</sup> )   | 13.33 (3.37 <sup>abcd</sup> ) | 6.69 (2.68 <sup>cdefg</sup> )  | 9.30 (3.07 <sup>bcdef</sup> ) |
| PH        | 21.00 (4.43 <sup>ab</sup> )   | 8.25 (3.10 <sup>abcd</sup> )  | 11.60 (3.46 <sup>abcde</sup> ) | 9.36 (3.06 <sup>bcdef</sup> ) |
| GL+PL     | 20.28 (4.55 <sup>ab</sup> )   | 8.25 (2.60 <sup>bcd</sup> )   | 5.20 (2.28 <sup>efg</sup> )    | 9.40 (3.12 <sup>bcdef</sup> ) |



|       |                            |                                |                                |                                |
|-------|----------------------------|--------------------------------|--------------------------------|--------------------------------|
| GM+PM | 25.43 (4.80 <sup>a</sup> ) | 14.48 ( 3.83 <sup>abcd</sup> ) | 12.50 ( 3.53 <sup>abcd</sup> ) | 9.75 ( 3.02 <sup>bcdef</sup> ) |
| GH+PH | 25.78( 4.80 <sup>a</sup> ) | 12.95 (3.81 <sup>abcd</sup> )  | 13.40 (3.7 <sup>abc</sup> )    | 9.50 (3.15 <sup>bcde</sup> )   |
| HW    | 25.80 (5.06 <sup>a</sup> ) | 17.13 ( 3.83 <sup>abcd</sup> ) | 16.03 ( 3.99 <sup>ab</sup> )   | 19.13 ( 4.34 <sup>a</sup> )    |
| C     | 5.5 (2.36 <sup>cd</sup> )  | 4.05 ( 2.01 <sup>d</sup> )     | 2.95 (1.82 <sup>g</sup> )      | 3.70 ( 2.03 <sup>g</sup> )     |
| CV%   |                            | 3.23                           |                                | 2.47                           |
| SE±   |                            | 0.59                           |                                | 0.32                           |

Means within columns followed by the same letters are not significantly different (Duncan's multiple range test) at  $p \geq 0.05$

**Table 5: Effect of treatments on yield of groundnut Varieties (Sodari and Medani) kg /ha**

| Treatment | yield kg /ha                       |                                    |                               |                               |
|-----------|------------------------------------|------------------------------------|-------------------------------|-------------------------------|
|           | Season 2007-2008                   |                                    | Season 2008-2009              |                               |
|           | Sodari                             | Medani                             | Sodari                        | Medani                        |
| GL        | 1040.0 ( 79.58 <sup>bcdefg</sup> ) | 456.0 ( 63.89 <sup>fg</sup> )      | 492.8(68.86 <sup>bcd</sup> )  | 730.0(81.94 <sup>bcde</sup> ) |
| GM        | 1013.0 ( 82.12 <sup>bcdefg</sup> ) | 710.5 ( 75.09 <sup>cdefg</sup> )   | 550.8(12.9 <sup>bcde</sup> )  | 912.2(88.19 <sup>cde</sup> )  |
| GH        | 523.3 (67.17 <sup>fg</sup> )       | 714.3 ( 82.2 <sup>bcdefg</sup> )   | 543.2(70.42 <sup>cde</sup> )  | 586.0(73.73 <sup>bcde</sup> ) |
| PL        | 1315.0 ( 113.1 <sup>abc</sup> )    | 638.5 ( 79.84 <sup>bcdefg</sup> )  | 512.2(71.5 <sup>cde</sup> )   | 551.7(71.27 <sup>cde</sup> )  |
| PM        | 1388.0 (115.6 <sup>abc</sup> )     | 821.3 ( 88.02 <sup>abcdefg</sup> ) | 658.5(79.86 <sup>bcde</sup> ) | 850.0(87.76 <sup>bcde</sup> ) |
| PH        | 1190.0 (107.9 <sup>abcdef</sup> )  | 541.3 ( 68.46 <sup>efg</sup> )     | 100.8(91.7 <sup>cde</sup> )   | 815.7(77.28 <sup>bcde</sup> ) |
| GL+PL     | 1291.0(113.5 <sup>abcd</sup> )     | 540.3 (69.77 <sup>defg</sup> )     | 621.3(78.75 <sup>bc</sup> )   | 961.8(89.28 <sup>bcde</sup> ) |
| GM+PM     | 1672.0 (122.8 <sup>ab</sup> )      | 14.48 ( 3.83 <sup>abcd</sup> )     | 1234.0(106.7 <sup>bc</sup> )  | 1144.0(105.5 <sup>bc</sup> )  |
| GH+PH     | 1681.0 (122.9 <sup>ab</sup> )      | 821.3 (88.2 <sup>abcdefg</sup> )   | 901.3(93.05 <sup>bcd</sup> )  | 928.2(96.36 <sup>bcd</sup> )  |
| HW        | 1789.0 (131.5 <sup>a</sup> )       | 870.3 ( 90.4 <sup>abcdefg</sup> )  | 1417.0(113.8 <sup>ab</sup> )  | 2258.0(148.0 <sup>a</sup> )   |
| C         | 129.1 (65.9 <sup>fg</sup> )        | 456.0 ( 49.44 <sup>g</sup> )       | 377.5(57.66 <sup>de</sup> )   | 267.3(51.23 <sup>e</sup> )    |
| CV%       |                                    | 9.28                               |                               | 8.28                          |
| SE±       |                                    | 1.31                               |                               | 1.21                          |

Means within columns followed by the same letters are not significantly different (Duncan's multiple range test) at  $p \geq 0.05$

## DISCUSSION

In the first experiment, chemical weed control was carried out to evaluate oxyfluorfen and imazethapyr herbicides for effective weed control in groundnut. Weed control achieved in this study in both seasons at various levels, this was



obviously due to the effect of the herbicides application, which was according to Chaudhary and Abbasi (2000), and Whilcut (1994). The use of herbicides in groundnut was possible and it led to improvement in groundnut yield parameters. In the first season Sodari variety showed no significant differences between the different treatments concerning the number of branches per plant of groundnut, however in the second season the combination of the two herbicides at their medium and high rates and the hand weeding control gave significant differences as compared to the control. The effective of herbicides treatments on number of branches per plant for groundnut was similar in both seasons. The above finding is in line with Mubarak (2004), who reported that, weeds reduced primary branches in groundnut by 20-40%. Number of branches per plant was known as morphological character which was controlled by several factors like the environmental growing conditions and the genetic wake up of the plant which in turn affect the rate of apical growth and elongation of the stem. There is a little effect of herbicide application on the average number of branches per plant.

Herbicides combination and hand weeding showed higher number of pods per plant as compared to the control in the first season for Sodari variety, the weeds reduced number of pods by 47.52% and 47.24% as compared to the control in the hand weeding and the combination of herbicides at medium and high rates. In second season the reduction was 54.39% between control and hand weeding. Also reduction was found to be 50.81% at control as compared to medium rate of combination. This result was similar to Ishag (1971), Hamada (2006) and Mubarak (2004) who showed that unrestricted weeds in control reduced the number of pods per plant that resulted in lowest pod weight per plant and reduced yield.

For Medani variety no significant between treatments, however the reduction of weed in number of pods per plant was 53.22% in control as compared to the hand weeding.

There were no significant differences between all treatments in the two varieties Sodari and Medani in number of seeds per pods that mean the number of seeds per pods was not associated with the weed control treatments this might be due to genetic character of the plant.

The second experiments were conducted to determine the critical period of weed competition with groundnut variety Medani. It is obvious that the unrestricted weed growth had a very bad effect on the crop growth and yield. The main dominant weed species were the broad- leaved as mainly: *Trainthema portulacastrum*, 30.65%, *Corchorus tricoloris*, 8.4% and *Ipomea cordofana*, 5.89% (.Appendix 1) As it is well known broad- leaved weeds due to it greater leaf area index (LAI), they occupied large areas and compete severity with weeds, this is in line with Mutnal(2006), who showed that the degree of damage to crops caused by weeds is related to the type, species and density of weeds, growing with crop and it is well known that weeds vary from place to another and season to season. This result was further confirmed by a number of authors who mentioned that the degree of damage of weeds in crops is mainly a function of the leaf area index as compared of that of the crop (Ishag, 1971; Badery, 2007; ELNaim and Ahmed, 2010).

#### Appendix 1: Weed flora reported on the experimental sites

| Scientific Name                  | Common Name        | Family           |
|----------------------------------|--------------------|------------------|
| <i>Impomea sinesis (Desr)</i>    |                    | Convolvulaceae   |
| <i>Echinochloa colounmle</i>     | Junglerice         | Poaceae          |
| <i>Lieptadenia hetrophylla</i>   |                    | Aristolochiaceae |
| <i>Gorchorus trilocularis L.</i> |                    | Titliaceae       |
| <i>Eurphorbia aegyptiaca</i>     | Prostrate spurge   | Euphorbiaceae    |
| <i>Brachiaria eruciformis</i>    | Sweet signal grass | Poaceae          |
| <i>Tribulus terrestris L.</i>    | Puncture vine      | Zygophyllaceae   |
| <i>Chenopodium album L.</i>      | Lamb's quarters    | Chenopodaceae    |
| <i>Brachiria reptans</i>         |                    | Poaceae          |
| <i>Hibiscus lobatus</i>          |                    | Malvaceae        |
| <i>Trianthema portulacastrum</i> |                    | Aizoaceae        |
| <i>Boerhavia erecta L.</i>       | Tar vine           | Nyctagginaceae   |
| <i>Amaranthus viridis L.</i>     | Pigweed            | Amaranthceae     |
| <i>Cyperus rotundus L.</i>       | Purple nutsedge    | Cyperaceae       |
| <i>Portulaca oleracea L.</i>     | Purslane           | Portulaceae      |
| <i>Amaranthus graecizans L.</i>  | White pig weed     | Amaranthaceae    |
| <i>Datura stramonrium L.</i>     | Jimson weed        | Solanaceae       |
| <i>Abutilon theophrasti</i>      | Velvet leaf        | Malvaceae        |





|                                 |                               |                |
|---------------------------------|-------------------------------|----------------|
| <i>Cyrodon dactylon</i>         | Dermuda grass                 | Poaceae        |
| <i>Eragrostis ciliaris</i>      |                               | Poaceae        |
| <i>Calotropis procera Ait</i>   | Sodom's Apple                 | Asclepiadaceae |
| <i>Chenopodium amaranticola</i> |                               | Chenopodiaceae |
| <i>Phyllanthus niruri L.</i>    | Gribe weed                    | Euphorbiaceae  |
| <i>Eclipta alba L.</i>          | Eclipta, False Americas Daisy | Asteraceae     |

## Conclusion:

Effective control of weeds and increasing pod yield in groundnut can be obtained with the application of pre-emergent herbicide Pursuit and Goal in combination of medium levels of them.

The critical period for controlling weeds was found to be 6 to 8 weeks after planting.

Residues of the two herbicides were greater under close condition such as glass house.

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