Efficacy of some Herbicides and Agricultural Practices on the Productivity of Sugar Beet (Beta vulgaris L.)

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ABSTRACT

Two field experiments were conducted on sugar beet crop (Beta vulgaris) to increase the quality of yield in sugar beet by applying mixtures of pre- and post-emergence herbicides and non-chemical strategies. Triflusulfuron-methyl, phenmedipham7.5+ desmedipham 1.5+ ethofumesate 11.5, S-metolachlor, propaquizafop, and clethodim, in addition, Triflusulfuron-methyl +hand hoeing, phemnedipham 7.5 + desmedipham 1.5+ ethofumesate 11.5 + hand hoeing, first hand hoeing, second hand hoeing, and untreated check were evaluated. All combinations were repeated twice. Percentage of weed reduction, total of all weeds, yield, yield components, percentages of total soluble solids (TSS), total yield of sugar beet ton per feddan and the percentages of weed density were calculated. Results revealed that, triflusulfuron-methyl + hand hoeing followed by phenmedipham7.5+ desmedipham 1.5+ ethofumesate 11.5+ hand hoeing and twice hand hoeing recorded equally the same effect followed by triflusulfuron-methyl followed by first hand hoeing when compared with untreated check. The reduction (weed control) percentages were 98, 96, 96 and 81, respectively compared with untreated (check) in the first season. However, in the second season, the reduction percentages were 96, 96, 86 and 80, respectively.

INTRODUCTION

Sugar beet is an important crop of arable rotations throughout the major growing regions of Egypt. It provides a valuable break crop returning organic matter to the soil and preventing the buildup of disease. The root has a sugar content of around 17 up to 25%. The top leaves of the sugar can be used feed cattle and sheep or may be ploughed back into the land to be used as a natural fertilizer. Weeds are considered to be a serious problem in most agricultural systems. The control of weeds is vital for increasing yield and quality of production (Vasileiadis et al. 2007). Weeds cause yield losses, hamper harvest, reduce quality of the harvest product, and perhaps harbor insects and diseases that may harm the crop. These weeds may cause about 60% losses in crop yield and at the highest densities of weeds, losses can reach up to 100%. Therefore, the controlling weeds is considered to be of crucial importance (Wiltshire et al. 2003).

Reduction from uncontrolled emerge weeds within early stages can reduce root yields by 26–100% (Schweizer and Dexter 1987; Rosso et al. 1996). The yield losses cannot be predicted because there are different varieties of weeds different weather and site, susceptibility of weeds to herbicides, and herbicide efficacy (Wellmann et al., 2000). The common herbicides applied in sugar beet are chloridazon, clopyralid, desmedipham, endothal, ethofumesate, lenacil, metamitron, phemnedipham and triflusulfuron-methyl (May and Wilson 2006). The present experiments were carried out in two growing seasons to evaluate and compare between the efficacy of certain herbicides and to compare between hand hoeing as a part of an integrated approach with mechanical and chemical weed control performance in sugar beet crops to minimize the competition between the productivity of crop and infestation of weeds.

MATERIALS AND METHODS

Field experiments were carried out in Abbis Farm (Faculty of Agriculture Farm), Alexandria, Egypt, for two successive seasons 2017 and 2018 to estimate the efficacy of some herbicidal treatments on both broad leaf and grassy weeds in Sugar beet crop (Beta vulgaris). The experiments were designed as a randomized complete block design with four replicates. Plot area was 21m² and sugar beet variety was Pleno (Bel101229) obtained from the Agricultural Research Center, Ministry of Agriculture, Egypt. Chemicals; Triflusulfuron – methyl, mixture of Phemnedipham7.5 +Desmedipham1.5+ Ethofumesate11.5, S-Metolachlor, Propaquizafop and Clethodim were obtained from the Agricultural Research Center, Ministry of Agriculture, Egypt.
Table 1. Illustrate the common name, trade name, source, rate of application and the time of application of the tested herbicides.

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Active ingredient</th>
<th>Rate (g (Cm²)/F)</th>
<th>Application Timing</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadleaves Herbicides:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1- POP-S 50% - WDG</td>
<td>Triflusulfuron – methyl</td>
<td>20g+20g</td>
<td>Post - emergence</td>
<td>My-Trade</td>
</tr>
<tr>
<td>2-BetaSana Trio 20.5 % - SC</td>
<td>Phemmedipham7.5 + Desmedipham</td>
<td>900 Cm²</td>
<td>Post - emergence</td>
<td>Syngenta- Agro</td>
</tr>
<tr>
<td>Grasses Herbicides:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1- Dual Gold 96% - EC</td>
<td>S-Metolachlor</td>
<td>420 Cm²</td>
<td>Pre- emergence</td>
<td>Starkeem</td>
</tr>
<tr>
<td>2- Damax-D 10% - EC</td>
<td>Propaquizafop</td>
<td>350 Cm²</td>
<td>Post - emergence</td>
<td>Arista live</td>
</tr>
<tr>
<td>3- Select Super 12.5% EC</td>
<td>Clethodim</td>
<td>500 Cm²</td>
<td>Post - emergence</td>
<td>Starkeem</td>
</tr>
</tbody>
</table>


RESULTS AND DISCUSSION

The most common weeds recorded in sugar beet crops during the two seasons 2017 & 2018 included Anagallis arvensis, Medicago hispida, Beta vulgaris, Malva spp and Coronopus squamatus as broad-leaf weeds, as well as Phalaris sp, Lolium sp and Avena sp as grassy weeds.

The effect of herbicide treatments applied in the two seasons 2017 & 2018 on fresh weight g / m2 of some broad leaf weeds is illustrated in Tables (2 and 3). The results demonstrate that the tested herbicides and the mechanical control caused significant influenced by weed removal (control) at different treatments. POP-S 20 +20g/Fed. + hand hoeing followed by Beta SanaTrio 900+900 cm³/Fed. + hand hoeing and twice hand hoeing recorded equally the same effect followed by POP-S and first hand hoeing compared with resulted from unweeded check plots. The corresponding reduction percentages weed control were 98, 96, 96, 84 and 81, respectively compared with untreated (check) in the first season. However, in the second season, the reduction percentages were 98, 96, 96, 86 and 80, respectively compared with unweeded check. The highest value of fresh weight and the most two dominant weeds were Beta vulgaris and Medicago hispida, where, the highest weed control percentage was 98 resulted from POP-S 20 +20g/Fed. + hand first hoeing and the lowest one was 80% resulted from hand hoeing. On the other hand, the results revealed that, there were significant effects between weed control treatments on crop yield (ton/fed), during first season in unweeded check resulted the lowest yield (9.38 ton/fed.) while, the highest yield 32.2 ton/fed. in twice hand hoeing treatment. On the second season, the highest value of crop yield was 33.9 ton/fed. in twice hand hoeing and the lowest was 10.1 ton/fed. in untreated plots. Treatments increased yield followed the twice hand hoeing, POP-S 20 +20g/Fed. + hand hoeing, Beta SanaTrio 900+900 cm³/Fed. + hand hoeing, first hand hoeing and POP-S respectively. Similar results obtained by Gagro and Dadacek (1996), who indicated that the best results were obtained in crop yields with herbicides treatment 2 l/ha of Betanal [phenmedipham] + 2 kg Goltix [metamitron]+ hoeing. In addition, Farzin and Hossein (2004), cleared that maximum control of weed in sugar beet was achieved with desmedipham plus phenmedipham plus propaquizafop at 0.46+0.46+0.1 kg a.i./ha and desmedipham + phenmedipham + thofumesate at rate of 0.23+0.23+0.23 kg a.i./ha. However, Deveikyte and Seibutis (2006), noticed that reduction of weeds by applying phenmedipham +desmedipham + ethofumesate at (15, 91+71+112 g a.i. /ha) and triflusulfuron respectively, reduced the biomass of broad-leaf weeds and weed control ranged from 55.0 to 85.0%. Also, Rapparini (2008), found that the application of desmedipham + hemiphenphm + ethofumesate proved to be highly effective against annual dicotyledonous weeds, giving 95.1-95.8% control at two doses.

Data presented in Tables (4 and 5) show that weed control treatments significantly reduced fresh weight of grassy weeds (g/m²) in two seasons.

Twice hand hoeing followed by Select Super, Damax-D and then Dual Gold, where found to be most potency the reduction percentages were 99, 93, 86 and 85 respectively compared with untreated (check) in the first season. However, in the second season, the reduction percentages were 100, 98, 95 and 95, respectively. The highest value of fresh weight and the most dominant weed was Phalaris sp in unweeded check.

Also, the data revealed that, there were significant effects between weed control treatments on crop yield (ton/fed), during the first season (the lowest crop yield was 2.22 ton/fed. in untreated), while, the highest crop yield was 33.55 ton/fed. in Damax-D treatment. On the second season, the highest value of crop yield was 24 ton/fed. in twice hand hoeing and the lowest was 9.3 ton/fed. in untreated plots.
Table 2. Effect of different treatments on some broad leaf weeds fresh weight (g / m²) in sugar beet crop (Beta vulgaris) (Pleno Bel 101229) during 2017 winter season.

<table>
<thead>
<tr>
<th>Treatment and Rate/Feddan</th>
<th>Beta vulgaris</th>
<th>Medicago hispida</th>
<th>Malva spp</th>
<th>Anagallis arvensis</th>
<th>Coronopus squamosus</th>
<th>Total</th>
<th>Yield ton/Feddan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
</tr>
<tr>
<td>POP-S 20+20g/Fed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hoeing</td>
<td>140±16.3b</td>
<td>67</td>
<td>0.5±0.1b</td>
<td>100</td>
<td>75±14.22c</td>
<td>79</td>
<td>3.5±1.7b</td>
</tr>
<tr>
<td>First hand hoeing</td>
<td>19±3.3d</td>
<td>97</td>
<td>0±0.0b</td>
<td>100</td>
<td>19±2c</td>
<td>95</td>
<td>0.5±0.3b</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>19±4.1d</td>
<td>95</td>
<td>8±2.8b</td>
<td>98</td>
<td>26±3.5c</td>
<td>93</td>
<td>2±0.6b</td>
</tr>
<tr>
<td>Untreated (Check)</td>
<td>420±95a</td>
<td>0</td>
<td>500±94a</td>
<td>0</td>
<td>365±43.8a</td>
<td>80</td>
<td>100±13.2a</td>
</tr>
<tr>
<td>% of weed density</td>
<td>29±3.8</td>
<td>78.5</td>
<td>25.3</td>
<td>6.9</td>
<td>3.8</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>LSD0.05</td>
<td>67.7</td>
<td>78.5</td>
<td>63.0</td>
<td>26.4</td>
<td>15.3</td>
<td>2.1</td>
<td></td>
</tr>
</tbody>
</table>

1Data are expressed as means ± SE from experiments with two times. Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

Table 3. Effect of different treatments on some broad leaf weeds fresh weight (g / m²) in sugar beet crop (Beta vulgaris) (Pleno Bel 101229) during 2018 winter season.

<table>
<thead>
<tr>
<th>Treatment and Rate/Feddan</th>
<th>Beta vulgaris</th>
<th>Medicago hispida</th>
<th>Malva spp</th>
<th>Anagallis arvensis</th>
<th>Coronopus squamosus</th>
<th>Total</th>
<th>Yield ton/Feddan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
</tr>
<tr>
<td>POP-S WDG 50%+20g/Fed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hoeing</td>
<td>143±11.7b</td>
<td>66</td>
<td>0±0.0c</td>
<td>100</td>
<td>45±19.1c</td>
<td>87</td>
<td>4±2.5b</td>
</tr>
<tr>
<td>First hand hoeing</td>
<td>20±7.4d</td>
<td>95</td>
<td>0±0.0c</td>
<td>100</td>
<td>14±4.3c</td>
<td>96</td>
<td>0±0.0b</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>28±12.8d</td>
<td>93</td>
<td>11±3.8c</td>
<td>98</td>
<td>18±8.4c</td>
<td>95</td>
<td>0±0.0b</td>
</tr>
<tr>
<td>Untreated (Check)</td>
<td>425±62.4a</td>
<td>0</td>
<td>473±51.2a</td>
<td>0</td>
<td>351±53.3a</td>
<td>80</td>
<td>116±8b</td>
</tr>
<tr>
<td>% of weed density</td>
<td>30.4</td>
<td>33.9</td>
<td>25.1</td>
<td>6.08</td>
<td>4.4</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>LSD0.05</td>
<td>38.2</td>
<td>30.8</td>
<td>31.4</td>
<td>16.4</td>
<td>7.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Data are expressed as means ± SE from experiments with two times. Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

Table 4. Effect of different treatments on some Grassy Weeds fresh weight (g / m²) of sugar beet crop (Beta vulgaris) (Pleno Bel 101229) during 2017 winter season.

<table>
<thead>
<tr>
<th>Treatment and Rate/Feddan</th>
<th>Phalaris sp</th>
<th>Lolium sp</th>
<th>Avena sp</th>
<th>Total</th>
<th>Total Yield Ton / Feddan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
<td>C%</td>
<td>Mean ± SE</td>
</tr>
<tr>
<td>Dual Gold 96%EC 420 Cm³/Fed.</td>
<td>95±30b</td>
<td>85</td>
<td>29±11.3b</td>
<td>86</td>
<td>17±5b</td>
</tr>
<tr>
<td>Damax-D 10% EC 350 Cm³/Fed.</td>
<td>99±32.7b</td>
<td>85</td>
<td>16±7.3b</td>
<td>92</td>
<td>14±3.2b</td>
</tr>
<tr>
<td>Select Super 12.5% EC 500 Cm³/Fed.</td>
<td>40±6.5c</td>
<td>94</td>
<td>10±5.1b</td>
<td>95</td>
<td>10±4b</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>8±3.2c</td>
<td>99</td>
<td>2±1.6c</td>
<td>99</td>
<td>1.5±0.9b</td>
</tr>
<tr>
<td>Untreated (Check)</td>
<td>64±56a</td>
<td>0</td>
<td>208±53.6c</td>
<td>0</td>
<td>70±15.8a</td>
</tr>
<tr>
<td>% of weed density</td>
<td>69.9</td>
<td>22.5</td>
<td>7.6</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>LSD0.05</td>
<td>47.9</td>
<td>37.7</td>
<td>19.4</td>
<td>2.48</td>
<td></td>
</tr>
</tbody>
</table>

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

1Data are expressed as means ± SE from experiments with two times.
The results are parallel with the finding of Bosak and Janos (1997), who reported that, the Dual 960 EC [metolachlor] at 2.2-2.5 l/ha, + Goltix 70 WP [metamitron] at 2-3 kg/ha, was highly effective treatment against Chenopodium sp., Matricaria sp. and Polygonum sp. in sugar beet crop which reduced weed by 99%, compared to weeded check. Similar results were also obtained by Padenov and Gadzhieva (2004), where the use of mixture Betanal Progress Of (90 g/l phenmedipham, 70 g/l cloridazon and 110 g/l ethofumesate with Pilot [quizalofop-p-ethyl]) increased the control of many weed species in sugar beet crop. In addition, Yukhin (2006), found that, pre-planting application of Dual Gold [metolachlor] + application of Betanal Progress AM [desmedipham + phenmedipham + ethofumesate] in mixture with Fusilade Forte [fluazifop-P-butyl] during the vegetative growing season of sugar beet was highly effective against weeds.

The effect of different treatments on yield parameters (plant, blade and stem length; leaf area and width of blade ) in sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during two seasons are shown in Tables 6 and 7. The data showed that weed control treatments were increased the tested yield parameters in the order Pop-S+hand hoeing > Beta SanaTri 900+900 Cm > twice hand hoeing > first hand hoeing and Pop-S the percentages of increase were 185.7, 75.3, 72.2, 61.9 and 55.6 respectively compared with untreated (check) in the first season. However, in the second season, the percentages were 159.3, 98, 77, 70.2 and 35.5, respectively, compared with untreated (check). The results are in parallel with Chauhan and Motiwale (1985), who reported that the weeds in sugar beet decreased root yields by 35-54%, compared with hand weeding, and the application of 2 kg Nortron [ethofumesate], 3 kg cloridazon and 2 kg alachlor /ha gave yields of 52.1, 46 and 48 t/ha, respectively compared with 45 ton with hand weeding and 27 ton without weed control. Domarađki (2007), reported that all weeding systems based on mixtures (3 herbicides Betanal Progress [desmedipham +ethofumesate +phenmedipham] +Safari [triflusulfuron] +Goltix [metamitron] +adjuvant) increased sugar beet yields compared to the standard systems (Betanal Progress [desmedipham +ethofumesate +phenmedipham] applied 3 or 4 times).

### Table 5. Effect of different treatments on some Grassy Weeds fresh weight (g / m²) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2018 winter season.

<table>
<thead>
<tr>
<th>Treatment and Rate / Feddan</th>
<th>Phalaris sp</th>
<th>Loliolm sp</th>
<th>Avana sp</th>
<th>Yield ton/Feddan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>% C</td>
<td>Mean</td>
<td>% C</td>
</tr>
<tr>
<td>Dual Gold 430Cm/Fed.</td>
<td>3.5±1.4</td>
<td>99</td>
<td>6.5±3.6</td>
<td>94</td>
</tr>
<tr>
<td>Damax-D350 Cm/Fed.</td>
<td>15±7.5</td>
<td>95</td>
<td>7±3.8</td>
<td>94</td>
</tr>
<tr>
<td>SelectSuper500 Cm/Fed.</td>
<td>0±0.0</td>
<td>100</td>
<td>0±0.0</td>
<td>100</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>9±6.3</td>
<td>97</td>
<td>10±4.4</td>
<td>91</td>
</tr>
<tr>
<td>Untreated (Check)</td>
<td>298±51.1</td>
<td>100</td>
<td>108±25.6</td>
<td>0</td>
</tr>
<tr>
<td>% of weed density</td>
<td>65.8</td>
<td>23.9</td>
<td>10.3</td>
<td>100</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;0.05&lt;/sub&gt;</td>
<td>25.3</td>
<td>15.2</td>
<td>7.2</td>
<td></td>
</tr>
</tbody>
</table>

*Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

### Table 6. Effect of different treatments on yield parameters (plant, blade and stem length; leaf area and width of blade ) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2017 winter season.

<table>
<thead>
<tr>
<th>Herbicide Treatment</th>
<th>Plant, height (cm)</th>
<th>stem length (cm)</th>
<th>Blade length (cm)</th>
<th>Bladc width (cm)</th>
<th>Leaf area (cm²)</th>
<th>Total %</th>
<th>%C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated (Check)</td>
<td>23.2±1.47</td>
<td>13.9±1.47</td>
<td>9.8±1.12</td>
<td>5.8±0.95</td>
<td>40.3±11.4</td>
<td>93.03</td>
<td>0</td>
</tr>
<tr>
<td>Pop-S 20+20</td>
<td>37.3±4.22</td>
<td>25.3±3.42</td>
<td>14.1±10.05</td>
<td>6.8±0.5</td>
<td>40.6±6.7</td>
<td>144.8</td>
<td>55.6</td>
</tr>
<tr>
<td>Beta Sana Trio 900+900 Cm</td>
<td>49.7±0.92</td>
<td>33.2±0.92</td>
<td>21.1±1.45</td>
<td>10.2±1.5</td>
<td>151.5±20.4</td>
<td>265.8</td>
<td>185.7</td>
</tr>
<tr>
<td>First hand hoeing</td>
<td>37.1±3.53</td>
<td>23.8±3.53</td>
<td>13.26±2.8</td>
<td>7.4±0.75</td>
<td>69.06±16.4</td>
<td>150.6</td>
<td>61.9</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>38.2±1.4</td>
<td>24±1.47</td>
<td>13.7±1.4</td>
<td>7.9±0.3</td>
<td>76.4±9.93</td>
<td>160</td>
<td>72.2</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;0.05&lt;/sub&gt;</td>
<td>5.6</td>
<td>4.94</td>
<td>2.55</td>
<td>1.46</td>
<td>10.88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

### Table 7. Effect of different treatments on yield parameters (plant, blade and stem length; leaf area and width of blade ) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2018 winter season.

<table>
<thead>
<tr>
<th>Herbicide Treatment</th>
<th>Plant, height (cm)</th>
<th>stem length (cm)</th>
<th>Blade length (cm)</th>
<th>Blade width (cm)</th>
<th>Leaf area (cm²)</th>
<th>Total</th>
<th>%C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated (Check)</td>
<td>26.7±0.72</td>
<td>14.7±0.5</td>
<td>10.7±1.2</td>
<td>5.8±0.95</td>
<td>42.4±7.4</td>
<td>99.99</td>
<td>0</td>
</tr>
<tr>
<td>Pop-S 20+20</td>
<td>37.3±2.53</td>
<td>22.3±2.0</td>
<td>15.2±0.28</td>
<td>6.8±0.5</td>
<td>95.2±8.7</td>
<td>176.83</td>
<td>77</td>
</tr>
<tr>
<td>Pop-S + hand hoeing</td>
<td>49.86±2.4</td>
<td>27.8±3.7</td>
<td>22.9±0.51</td>
<td>10.2±1.5</td>
<td>148.2±16.2</td>
<td>259</td>
<td>159.3</td>
</tr>
<tr>
<td>BetaSana Trio 900+900 Cm</td>
<td>44.2±1.2</td>
<td>25.8±1.96</td>
<td>17.9±2.8</td>
<td>7.6±0.55</td>
<td>102.2±9.6</td>
<td>197.7</td>
<td>98</td>
</tr>
<tr>
<td>First hand hoeing</td>
<td>29.2±0.9</td>
<td>16.5±0.3</td>
<td>12.9±0.96</td>
<td>7.4±0.75</td>
<td>69.4±4.5</td>
<td>135.4</td>
<td>35.5</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>39.9±5.6</td>
<td>24.4±1.4</td>
<td>16.2±1.0</td>
<td>7.9±0.25</td>
<td>81.5±6.5</td>
<td>170.72</td>
<td>70.2</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;0.05&lt;/sub&gt;</td>
<td>3.94</td>
<td>3.6</td>
<td>2.5</td>
<td>1.4</td>
<td>15.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.
and 115, respectively. These results revealed that, Pop-
S+hand hoeing was highly effective in weed control and
gave the highest value of yield component and the hand
hoeing is the lowest one. On the other hand, all treatment
either in the first season or second season did not affect the
TSS values. The results are in agree with Abd El-Aal
(1995), who found that TSS values did not significantly
differ between treated and untreated sugar beet plots.
Zargar et al. (2010), indicated that times of mechanical
control and herbicides have the most reduction on density
and weeds biomass of (Chenopodium album
and Amaranthus retroflexus) and mechanical control at 4-6
leaves stage or using herbicide Goltix + Betanal progress
were the most efficient treatments.

Table 8. Effect of different treatments on yield parameters (plant, blade and stem weight; fruit length, diameter and TSS) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2017 winter season.\(^a\)

<table>
<thead>
<tr>
<th>Herbicide Treatment</th>
<th>Plant weight (gm)</th>
<th>Blade weight (gm)</th>
<th>Fruit length (cm)</th>
<th>Fruit diameter (cm)</th>
<th>TSS (g/L)</th>
<th>Total %C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated (Check)</td>
<td>70.2±13.3</td>
<td>31.1±2.4</td>
<td>22.3±7.6</td>
<td>10.2±0.4</td>
<td>6.2±0.3</td>
<td>24±1</td>
</tr>
<tr>
<td>Pop-S 20+20</td>
<td>198.2±21.6</td>
<td>130.3±11.3</td>
<td>67.7±11.3</td>
<td>13.1±1</td>
<td>8.7±1.2</td>
<td>25.3±0.28</td>
</tr>
<tr>
<td>Pop-S+ hand hoeing</td>
<td>391.2±23.4</td>
<td>221.2±12.4</td>
<td>127.7±5.9</td>
<td>16.7±0.5</td>
<td>11.0±0.8a</td>
<td>25. 5±0.5</td>
</tr>
<tr>
<td>Beta Sana Tario</td>
<td>297.8±16.8</td>
<td>196.6±11.7</td>
<td>112.5±8.1</td>
<td>21.7±1.2</td>
<td>10.7±1.5b</td>
<td>25.6±1.2</td>
</tr>
<tr>
<td>First hand hoeing</td>
<td>207.6±15.5</td>
<td>66.2±8.3</td>
<td>45.7±7.5</td>
<td>12.6±1.2</td>
<td>7.3±0.6</td>
<td>24.6±0.57</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>228.4±11.7</td>
<td>177.2±18.1</td>
<td>65.7±6.7</td>
<td>19.3±1.1</td>
<td>10.5±1.8a</td>
<td>25±2.8</td>
</tr>
</tbody>
</table>

\(^a\)Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

Table 9. Effect of different treatments on yield parameters (plant, blade and stem weight; fruit length, diameter and TSS) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2018 winter season.\(^a\)

<table>
<thead>
<tr>
<th>Herbicide Treatment</th>
<th>Plant weight (gm)</th>
<th>Blade weight (gm)</th>
<th>Fruit length (cm)</th>
<th>Fruit diameter (cm)</th>
<th>TSS (g/L)</th>
<th>Total %C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated (Check)</td>
<td>73.2±26.9</td>
<td>34.3±5.02</td>
<td>31.9±5.3</td>
<td>10.7±3.4</td>
<td>6.5±0.6</td>
<td>25.3±0.28</td>
</tr>
<tr>
<td>Pop-S 20+20</td>
<td>221.9±14.3</td>
<td>150±8</td>
<td>74.9±4.9</td>
<td>12.7±1.2</td>
<td>8.3±0.7a</td>
<td>25.3±0.57</td>
</tr>
<tr>
<td>Pop-S+ hand hoeing</td>
<td>434.5±23.8</td>
<td>296.3±45</td>
<td>138.6±19.3</td>
<td>16.8±0.3</td>
<td>11.2±0.28</td>
<td>24.8±0.34</td>
</tr>
<tr>
<td>Beta Sana Tario</td>
<td>393.3±16.1</td>
<td>248±34.7</td>
<td>99.1±11.6</td>
<td>20.3±0.6</td>
<td>11±1</td>
<td>24.3±3.05</td>
</tr>
<tr>
<td>First hand hoeing</td>
<td>179.8±17.7</td>
<td>105.4±16.02</td>
<td>60.1±8.2</td>
<td>11.7±0.6</td>
<td>7.1±0.28</td>
<td>25.5±0.5</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>242.3±11.4</td>
<td>187.5±13.8</td>
<td>76.2±9.4</td>
<td>18.2±0.3</td>
<td>10.8±1</td>
<td>24.3±2.3</td>
</tr>
</tbody>
</table>

\(^a\)Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

The effect of grassy herbicides treatments on the yield parameters (plant, blade, stem length, leaf area and width of blade) and (Plant, blade, stem length, fruit length, diameter and TSS) in sugar beet crop (Beta vulgaris) were recorded in Tables (10 and 11) The data showed that treatments increased the tested parameters of yield as a follow: Select Super followed by Dual Gold > Damax-D and twice hand hoeing compared with untreated check in the first season. The results showed that, Select Super was the highly effective in weed control and to give the highest value of yield component, while twice hand hoeing was the lowest one. It was found that, the application of Fusilade super 12.5% (fluazifop-p-butyl) at 3.2 – 4.0 l/ha. against quackgrass (Elymus repens L.) in fodder beet fields at the 3 to 6 leaf stage, increased root yield by 31-40% Tyla and Petrovici (1996). Ulma et al. (2003), recorded that the post-emergence applications of Betanal Progress [mesdemipham +phenmedipham] at 11/ha. in combination with Lontrel-300 [clopyralid] and Fururo Super [fenoxaprop] increased the yield and the sugar content of sugar beet.

Table 10. Effect of different treatments on yield parameters (plant, blade and stem weight; leaf area and width of blade) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2017 winter season.\(^a\)

<table>
<thead>
<tr>
<th>Herbicide Treatment</th>
<th>Plant height (cm)</th>
<th>Plant stem length (cm)</th>
<th>Blade length (cm)</th>
<th>Blade width (cm)</th>
<th>Leaf area (cm²)</th>
<th>Total %C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Gold 350 Cm²/Fed</td>
<td>41.6±2.7</td>
<td>22.9±2.2</td>
<td>17.9±1.7</td>
<td>10±0.9</td>
<td>118.5±10.5</td>
<td>211</td>
</tr>
<tr>
<td>Damax-D 350 Cm²/Fed.</td>
<td>42.2±2.7</td>
<td>24.0±3.3</td>
<td>15.8±5.2</td>
<td>10.4±0.9</td>
<td>111.5±12.1</td>
<td>204</td>
</tr>
<tr>
<td>Select Super 500 Cm²/Fed.</td>
<td>44.7±6.2</td>
<td>26.3±4.0</td>
<td>17.5±1.8</td>
<td>11.5±1.1</td>
<td>134.5±16</td>
<td>235</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>36.2±3.2</td>
<td>18.3±2.3</td>
<td>16.2±3.3</td>
<td>9.1±0.7</td>
<td>99±1±1.8</td>
<td>179</td>
</tr>
<tr>
<td>Untreated (Check)</td>
<td>23.7±1.07</td>
<td>11.8±1.6</td>
<td>11.6±1.4</td>
<td>6.9±0.9</td>
<td>58.4±7.1</td>
<td>112.5</td>
</tr>
</tbody>
</table>

\(^a\)Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.

Table 11. Effect of different treatments on yield parameters (plant, blade and stem weight; fruit length, diameter and TSS) of sugar beet crop (Beta vulgaris) (Pleno (Bel 101229)) during 2017 winter season.\(^a\)

<table>
<thead>
<tr>
<th>Herbicide Treatment</th>
<th>Plant weight (gm)</th>
<th>Stem weight (gm)</th>
<th>Blade weight (gm)</th>
<th>Fruit weight (cm)</th>
<th>Fruit length (cm)</th>
<th>Fruit TSS</th>
<th>Total %C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated (check)</td>
<td>99.6±9.1</td>
<td>54±4.3</td>
<td>52.8±7.1</td>
<td>8.75±0.25</td>
<td>25.4±0.4</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Dual Gold 350 Cm²/Fed</td>
<td>363±32.0</td>
<td>225.8±14.0</td>
<td>126±9.6</td>
<td>13±1</td>
<td>8.7±1.25</td>
<td>26.4±1.3</td>
<td>763</td>
</tr>
<tr>
<td>Damax-D 350 Cm²/Fed.</td>
<td>327.3±21</td>
<td>197.5±21.2</td>
<td>129.5±11.3</td>
<td>16±2.5</td>
<td>10.6±0.53</td>
<td>25.7±1.1</td>
<td>707</td>
</tr>
<tr>
<td>Select Super 500 Cm²/Fed.</td>
<td>407.3±20</td>
<td>255.8±24.0</td>
<td>136.8±14.3</td>
<td>21.75±1.5</td>
<td>11.5±2.5</td>
<td>25.5±1.5</td>
<td>859</td>
</tr>
<tr>
<td>Twice hand hoeing</td>
<td>334±24.0</td>
<td>224±18.0</td>
<td>117.8±16.7</td>
<td>14.75±1.25</td>
<td>730±0.8</td>
<td>23.88±0.28</td>
<td>722</td>
</tr>
</tbody>
</table>

\(^a\)Data are expressed as means ± SE from experiments with two times.

Mean values within a column sharing the same letter are not significantly different at the 0.05 probability level.
REFERENCES


Neama A. Gouda

Kفاعة مبيدات الحشائش وبعض المعلقات الزراعية على النتجية بنجر السكر

قسم النواصق الذياء ابراهيم جوده

 Depression in the yield of sugar beet (%)

Kفاعة مبيدات الحشائش وبعض المعلقات الزراعية على النتجية بنجر السكر

Crops of sugar beet (%)...