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YIELD AND ITS COMPONENTS OF SOYBEAN AS AFFECTED BY TILLAGE SYSTEM, PLANT POPULATION DENSITIES AND WEED CONTROL TREATMENTS.

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ABSTRACT

Two field experiments were carried out at the Faculty of Agriculture's experimental farm during the two successive growing seasons of 2019 and 2020 to investigate the effects of the tillage system, plant densities, and weed control methods as well as their interactions on the yield and its components of soybean (*Glycine max*, L., Merrill) cv. Giza111. The preceding crop was wheat, which was ridge-planted in both seasons.

The obtained indicated that full-tillage improved all examined parameters of soybean (plant height, branches number, number of pods per plant, 100 seeds weight, seed yield /plant and /fed., and straw yield/fed.) comparing to no-till system in both seasons. Plant population at a rate of 140000 plant/fed. gained the highest values of branches per plant, pods number per plant and 100 seed weight, while the heaviest seed yield/plant. As well as seed and straw yields per feddan were recorded with 186666 plant/fed. in both seasons. Plants received Select super 500 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS) produced the tallest plants, the highest number of pods/plant and 100 seed weight, however, the heaviest yields either of seeds or straw were recorded with Select super 250 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS). It could be concluded that for the best productivity of soybean, it should be to adapt full-tillage system, with plant density of 186666 plants/fed. and treated the plants with Select super 250 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS).

Key words: tillage, plant density, weed control, soybean, yield.

INTRODUCTION

The soybean is one of major global agribusiness legume innate to East Asia that is universally cultivated for its edible bean, that has a several types of applications. More research is required to increase soybean production under diverse conditions because it is an essential food crop for human consumption and a significant source of food, protein, and oil (42-45% protein and 20-25% oil). The United States, Brazil, Argentina, China, and India are the top five soybean-producing nations in the world **(Soliman *et al.* 2015** and **Pagano and Miransari, 2016)**.

From an economical view, fewer labor and fuel consumption were associated with crops production with no-till **(Gozubuyuk *et al.*, 2020)**. No-till lowers greenhouse gas emissions and enhances soil health relative to tillage-based agricultural production **(Mangalassery *et al.*, 2014** and **Nunes *et al.*, 2018)**. **Horowitz *et al.* (2010)** claimed that in most agricultural production systems, the choice of tillage is a crucial management decision that can affect crop output and profitability. No-till agriculture has increased recently due to the lower cost of production, making up 36% of all cropland in the US in 2009. Also, because it affects both crop production in terms of yield and environmental effects, soil tillage is essential. Since ancient times, soil tillage has been employed to increase water and nutrient availability while reducing weed density **(Lal, 2009)**. According to **Vetsch *et al.* (2007)**, intensive tillage practices boosted soybean growth, such as height, branches, and leaf area as well as number of pods and seed yield per plant and per hectare.

A crucial factor in the success of agricultural production is soybean plant density. Estimating soybean plant density in the later stages of growth should allow the final plant number to be estimated and represent the status of the harvest due to the large number of plants per unit area, early plant overlapping, and eventual plant loss. Key yield components are plant height, branch number, and productive nodes **(Argenta *et al.*, 2001; Ranđelović *et al.*, 2020)**.

Unless effective weed control measures are used, weed competition in soybean production begins with crop germination and lasts until crop maturity. Early weed competition might harm soybean production **(Eyherabide and Cendoya, 2002)**. Due to weed infestations and the ensuing production losses, efficient weed management strategies are required in soybean farming. Mechanical weeding is a crucial to integrated weed management systems as chemical weed control **(Kunz *et al.*, 2015)**. Operations involving shallow tillage are used to suppress weeds. This system's primary goal is to encourage weed emergence prior to crop planting by early soil tillage beginning days or weeks before sowing and by killing them with broad-spectrum herbicides **(Barberi, 2003)**.

The aim of this study is to get a better knowledge of how soybean (*Glycine max*, L., Merrill) cv. Giza111 yield and yield components are influenced by the tillage system, plant population density, and weed management strategy under Minia Governorate conditions.

MATERIALS AND METHODS

Two field experiments were carried out at the experimental farm of the Faculty of Agriculture, Minia University, during two successive growing seasons of 2019 and 2020 to examine the impact of tillage system, plant densities, and weed control treatments in addition to their interactions on yield, and its attributes of soybean (*Glycine max*, L., Merrill) cv. Giza111. The split-split-block design with three replicates was used for this work. Two types of tillage system (no tillage and full tillage) are used in the main plots (A), while three plant population densities (140.000, 186.666, and 210.000 plants per fed.) are used in the sub-plots (B), and the five weed control methods [Select super 250 ml/fed. + Basagran 750 ml/fed. (35 DAS), Select super 250 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS), Select super 500 ml/fed. + Basagran 750 ml/fed. (35 DAS), Select super 500 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS), and hand hoeing twice (35 and 50 DAS)] occupied the sub-sub-plots (C). Each experimental plot consisted of five ridges, four metres in length, 60 cm apart, and occupying a total area of 12 m^2 (1/350 feddan). Dry method sowing (Afir) was done on hills on one or both sides of ridges on May 15^{th} in both seasons. Irrigation started immediately after sowing, with the first irrigation was take place 15 days later. The number of seedlings per hill was thinned depending on plant population treatments before the first irrigation. Phosphorus was added to prepare the soil for planting in form of calcium superphosphate (15.5% P_2O_5) at the rate of 150 kg/fed. *Bradyrhizobuim japonicum* was utilized to inoculate the soybean seeds before planting. Starter dose of nitrogen fertilizer was added at a rate of 15 kg N/fed. in the form of urea 46% N with sowing irrigation. According to **Chapman and Pratt (1961)**, some physical and chemical examination of the experimental soil throughout the two seasons of 2019and 2020 are listed in Table (1).

Data recorded:

At harvest, five plants were randomly selected from the second ridge in each sub-sub-plot to collect the following data: plant height (cm), branches number, number of pods per plant, 100 seeds weight (g), seeds yield (g/plant). Grains yield (kg/fed.) and straw yield (kg/fed.) were calculated on the basis of the three middle ridges.

Statistical analysis:

Following the guidelines outlined by **Steel and Torrie (1980)**, all data from each season was statistically analyzed. The differences among treatment means were examined at a level of 5% probability using the Least Significant Differences test (L.S.D.).

RESULTS

1. Plant height (cm):

With regard to the tillage system, plant densities, weed management treatments, and their interactions and its effects on plant height at harvesting,

Table (2) displays the means of plant height at harvest in the 2019 and 2020 growing seasons. The analysis of variance showed that the tillage system used during the 2020 season had a highly significant impact on plant height.

Over no-till sowing, full-till generated plants that were higher in 2020 season. These results can be linked to no-till sowing's impact on soil upkeep (water and nutrients) and losses due to erosion, which had an impact on the vigor of seedling growth and, in turn, plant height. These findings concur with those made by **Vetsch *et al* (2007)** and **Acharya *et al*. (2019).**

In the 2019 and 2020 seasons, the impact of plant population densities on plant height was highly significant. Data from Table 2 showed that plant height was increased gradually and dramatically as plant population density increased from 140000 to 210000 plant/fed. in both seasons. It is noteworthy to note that sowing at a plant density of 210000 plants per fed. resulted in the tallest plants, followed by those planted at 186666 plants per fed with significant differences, while sowing at a plant density of 140000 plants per fed generated the shortest plants. During both seasons, this pattern persisted. The fundamental reason for this is because dense plants' lower light levels within their canopies encourage the synthesis of IAA in stem tissues. As a result, a surge in stem cell elongation and division, which turn on plant height, so, an increase in plant height might be expected. These findings are concur with those reported by **Khan *et al.* (2003) and Kale *et al.* (2015)**.

As demonstrated in Table 2, highly significant changes in plant height caused by weed control interventions were detected in 2019 season.

The plots that received Select super 500 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS) produced the tallest plants at harvesting in the first season, while the plots that received Select super 250 ml/fed. + Basagran 750 ml/fed. (35 DAS) produced the shortest plants. The tallest plants were harvested in the second season using manual hoeing twice at 35 and 50 DAS, whereas the shortest plants were harvested in plots treated with Select Super 250 ml/fed. with Basagran 750 ml/fed. (35 DAS). The aforementioned effects may be linked to the herbicide's involvement in weed control, which allows soybean plants to grow more successfully and, as a result, increases plant vigor, size, and height. These results are in agreement with the findings of **Samarajeewa *et al.* (2006), Hassan (2015)** and **Kale *et al.* (2015)**.

The interaction between the tillage system and plant density had a highly significant impact on plant height at harvest in both growing seasons of 2019 and 2020. Full-till with 210000 plants per fed produced the tallest plants, while no-till with140000 plants per fed.produced the shortest ones.

In 2020 growing season, the interaction between the weed management treatments and the tillage system had a significant impact on this trait. In the second growing season, full-tilled plots with manual hoeing twice at 35 and 50 DAS produced the tallest plants, while full-tilled plots with Select

super 250 ml/fed. + Basagran 750 ml (35 DAS) produced the shortest ones.

The interaction between plant density and weed control treatments had a highly significant impact on plant height at harvest in the 2020 season. Most often, when planting 210000 plants and spraying with Select Super 500 ml/feeding + Basagran 750 ml/feeding (35 DAS), the tallest plants were observed. However, the pots with 140000 plants/fed. and Select super 250 ml/fed. + Basagran 750 ml/fed. (35 DAS) recorded the shortest plants.

Plant height at harvest in the 2019 season was significantly impacted by the second order of interaction among the factors under study. While full-till plots sown at 140000 plants/fed. and treated with Select super 250 ml/fed. + Basagran 750 ml/fed. (35 DAS) produced the shortest plants, no-tilled plots sown at 210000 plants/fed. and treated with Select super 500 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS) recorded the tallest plants. In both seasons, other types of interactions had no significant impact on this trait.

2. Number of branches per plant:

The data provided in Table 3 shows the effect of tillage systems, plant densities, weed management treatments and their interactions on number of branches per plant in 2019 and 2020 seasons.

It is clear that the tillage system had not exhibit significant impact on number of branches per plants in both growth seasons.

According to Table (3), there were no appreciable variations between the number of branches/plant produced by no-till and full-till sowing at harvest in both seasons. However, full-till sowing slightly increased the number of branches/plant comparing to no-till sowing in both the 2019 and 2020 growing seasons. Our results might be explained by the impact of tillage on soil qualities, the improvement in ventilation, the creation of a suitable bed for soybean plants, and the provision of sufficient moisture for plant growth and lateral branching. Both of **Vetsch *et al.* (2007) and Acharya *et al.* (2019)** emphasized the advantage of tillage on branches number plant^{-1}.

Concerning the impact of plant population densities on branch number plant^{-1}at harvest in both seasons, it was quite important to notice that number of branches per plant reduced significantly as plant population density increased, going from 140000 to 210000 plant/fed. in both seasons (Table 3). It's noteworthy to note that growing soybeans at a plant population density of 140000 plants per fed produced the highest branches per plant, followed by those sown at 186666 plants per fed with significant differences, and those at 210000 plants per fed produced the lowest branches. Both seasons showed this pattern. This is primarily explained by the fact that population density impacts how plants compete with one another for resources like light, water, and nutrients, which is crucial for healthy plant development, dry matter accumulation, and yield (grain) production. Because of this, it provides for enough levels of light, air, moisture, and nutrients, which promotes the growth of branches within the low population density number.

Our results are consistent with those from **Sharief *et al.* (2003), Hassan (2015) and Kale *et al.* (2015)**.

According to Table 3, weed control treatments had no significant impact on the number of branches per plant in both the 2019 and 2020 growing seasons. Select super (500 ml/fed.) + Basagran (750 ml/fed.) at 35 DAS produced the maximum number of branches (3.47 and 4.33) at harvest in the first and second season, respectively, whereas Select super (500 ml/fed.) at 35 DAS + Basagran (750 ml/fed.) at 50 DAS produced the lowest number of branches of 2.98 and 3.72. Our findings are in acceptance with those gathered by **Abbasi *et al.* (2006), Vitalkar *et al.* (2006)** and **Kale *et al*. (2015).**

It was easy to see that none of the interactions between the experimental factors evaluated had a significant impact on the number of branches or plants in both seasons.

3. Number of pods per plant:

The data presented in Table 4 shows how tillage practices, plant densities, weed management methods, and their interactions affect the average number of pods produced per plant throughout the 2019 and 2020 growing seasons.

According to the analysis of variance, the tillage system's impact on the number of pods per plant at harvest in the 2019 did not reach to significant levels. Full-till slightly surpassed no-till in number of pods/plant in both seasons. These outcomes match those attained by **Acharya *et al*. (2019)**.

When it came to the impact of plant population densities on the number of pods per plant, it was highly significant in the first season but did not show a significant impact in the second. Data from Table (4) clearly showed that the number of pods/plant declined gradually and dramatically as plant population densities increased from 140000 to 210000 plant/fed. in the first season. It's noteworthy to note that sowing at a plant density of 140000 plants per fed produced the highest number of pods per plant, followed by those sown at 186666 plants per fed with significant differences, and finally, sowing at 210000 plants per fed created the lowest pods. These findings concur with those declared by **Sundari (2003)** and **Murilo *et al*. (2022)**.

As indicated in Table (4), weed control treatments revealed highly significant changes in the number of pods/plant as a result of in the 2019 season. At the same time, it did not show any notable differences in the 2020 season.

The treatment of Select super (500 ml/fed.) at 35 + Basagran (750 ml/fed.) at 50 DAS produced the largest number of pods/plant at harvest in the first season, whereas the plots receiving Select super (250 ml/fed.) at 35 + Basagran (750 ml/fed.) at 50 DAS produced the lowest numbers. The findings reported here are in consensus with those achieved by **Vitalkar *et al.* (2006), Moghadam *et al.* (2010) and Hassan (2015)**.

Regarding the impact of interactions among the factors evaluated on the total number of pods per plant, it was shown

that the tillage system X plant densities interaction significantly affected the number of pods per plant at harvest in 2019. Full-till with 140000 plants/fed produced the highest value of number of pods/plant (37.91), while no-till with 210000 plants/fed produced the lowest one (26.13 pods).

The number of pods/plant in the 2019 season was significantly affected by the second order of interaction among the factors under study. It's interesting to note that full-till plots with 140000 plants per fed. and Select super (500 ml/fed.) at 35 DAS + Basagran (750 ml/fed.) at 50 DAS gave the highest number of pods/plant, while no-till plots with 210000 plants per fed. and hand hoeing twice at 35 and 50 days recorded the lowest one. All other types of interactions among studied factors did not show significant effect on this trait in both seasons.

4. Weight of 100-seed (g):

The data in Table (5) show the average 100-seed weight (g) at harvest in the 2019 and 2020 growing seasons as influenced by tillage systems, plant densities, weed management treatments, and their interactions. The results of the analysis of variance showed that the 100-seed weight was not significantly affected by the tillage system either in the 2019 or 2020 seasons. A slight increase in this trait was found due to full-till compared to no-till in both growing seasons.

Plant population densities had a significant impact on 100-seed weight during the harvesting seasons of 2019 and 2020. The data in Table (5) made it abundantly evident that as plant population densities increased from 140000 to 210000, weight of 100 seeds was decreased in both seasons. It is interesting to note that the highest values for this trait were obtained with a plant density of 140000 plants per fed, followed by those obtained with a plant density of 186666 plants per fed, and the shortest values were obtained with a plant density of 210000 plants per fed. This pattern persisted throughout both seasons. These findings coincide with those provided by **Khajouci-Nejad *et al*. (2004)** and **Moshiur *et al*. (2011)**.

As seen in Table (5), notable variations in 100-seed weight were detected as a result of weed control treatments in the 2019 and 2020 seasons. The highest values of 100-seed weight (14.61 and 16.27 g) were found with Select super 500 ml/fed., (35 DAS) + Basagran 750 ml/fed., (50 DAS) in the first and second seasons, respectively. The lightest 100-seed weight, meanwhile, came from plots that received manual hoeing twice (35 and 50 DAS) in the first season and from plots that received Select super 250 ml/fed. + Basagran 750 ml/fed. (35 DAS) in the second season, respectively. The aforementioned results align with those attained by **Abbasi *et al.* (2006), Moghadam *et al.* (2010)** and **Lal *et al.* (2017).**

In the 2019 and 2020 seasons, the interaction between the tillage system and weed management treatments had a highly significant impact on this trait. The plots that received full-tillage and Select super 250 ml/fed. (35 DAS) + Basagran 750 ml (50 DAS) had the heaviest weights of 15.51 and 19.39 g in the first and second seasons, respectively. However, the lightest ones (13.16 and

16.45 g) were found for no-tilled plots that received Select super 250 ml/fed. + Basagran 750 ml (50 DAS) in the first season and for no-tilled plots that received manual hoeing twice (35 and 50) in the second season, respectively.

The weight of 100 seed was significantly affected by the interaction effect between plant density X weed control treatments in the growing seasons of 2019 and 2020. The treatment of sowing 186666 plants/fed. plus spraying with Select super 500 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS) produced the heaviest 100-seed weight (15.48 g) in the first season, but the highest value of19.35 g was obtained with sowing 186666 plants/fed. plus Select super 250 ml/fed. (35 DAS) + Basagran 750 ml/fed. While the lowest ones (12.93 and 16.16 g) were achieved in the first and second growing seasons, respectively, in plots that had been sown at 210000 plants per fed. and sprayed with Select super 250 ml (35 DAS) + Basagran 750 ml (50 DAS).

The weight of 100 seeds was significantly affected by the second order of interaction among the factors under study in the growing seasons of 2019 and 2020. The highest values of 16.67 and 18.84 g were produced by full-till plots sown at 140000 plants per feddan and receiving Select super 500 ml per fed. plus Basagran 750 ml (35 DAS), whereas the lowest values of 12.02 and 13.03 g were produced in no-tilled plots sown at 210000 plants/fed. and receiving hand hoeing twice (35 and 50 DAS) in the first and second seasons, respectively.

Tillage system X plant densities interaction did not exert significant effect on this trait in both season.

5. Seed yield/plant (g):

The data summarized in Table (6) show the average seed yield per plant (g) as influenced by tillage systems, plant densities, weed management methods, and their interactions in the 2019 and 2020 seasons. According to the analysis of variance, the tillage system used had considerable effects on seed yield/plant in both the 2019 and 2020 growing seasons. In the first and second seasons, full-till treatment out yielded no-till treatment as produced 24.88 and 31.10 g, respectively. These findings coincide with those made by **Kwaw and Al-Kaisi (2006), Sweeney (2017)** and **Cheţan *et al*. (2021)**.

Data from Table (6) showed that plant population densities had a highly significant impact on seed yield per plant in both seasons. The highest values (25.09 and 31.36 g) were achieved with a plant density of 186666 plants per fed, followed by those sown at 140000 plants per fed, and the lowest values (22.74 and 28.43 g) were obtained with a plant density of 210000 plants per fed. This pattern persisted throughout both seasons. These findings concur with those of **Sundari (2003), Zaimoglu *et al*. (2004)** and **Moshiur *et al*. (2011)**.

Table (6) indicates that the influence of weed management treatments on seed yield/plant at harvest in the 2019 and 2020 seasons did not demonstrate any appreciable effects. The greatest results (24.64 and 30.80 g) were achieved in the

plots that received Select super 250 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS). While, the lowest ones (23.37 and 29.21 g) were recorded for plots received Select super 500 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS) in the first and second seasons, respectively. These findings correlate with those submitted by **Abbasi *et al.* (2006)** and **Hassan (2015)**.

It was evident that the tillage system X plant densities interaction possessed significant effect on seed yield/plant in the 2019 and 2020 seasons. Plots planted at 186666 plants per fed. under full-till gave the greatest values of 26.24 and 32.80 g in the first and second seasons, respectively. The lowest results of 22.41 and 28.01 g were generated in plots that were no-tilled and having 210000 plants per fed. in the first and second seasons, respectively.

The seed yield/plant during harvest in the 2019 season was significantly affected by the second order of interaction among the factors evaluated. The highest values (28.21 and 35.27 g) were obtained from full-till system plots sown at 140000 plants/fed. and receiving Select super 250 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS), whereas the lowest values (20.53 and 25.67 g) were obtained from no-till system plots sown at 210000 plants/fed. and receiving Select super 250 ml/fed. All other types of interaction did not show significant effect on this trait in both seasons.

6. Seed yield/fed (kg):

The data in Table (7) show the average seed yield (kg/fed.) at harvest in the 2019 and 2020 growing seasons as influenced by tillage techniques, plant densities, weed control methods, and their interactions.

Seed yield (kg/fed.) was significantly affected by tillage systems in the second season, while, the effect did not reach the significance level in the first season. Full-till produced the highest seed yield/fed. In both seasons, with no significant differences in the first season.

These findings coincide with those of **Horowitz *et al.* (2010)** and **Sweeney *et al.* (2022)**.

Data from Table (7) showed that plant population densities had a significant impact on seed yield (kg/fed.) of 2019 and 2020 seasons. It's interesting to note that the heaviest seed yield (kg/fed.) of 1509.56 and 1886.95 kg were obtained with medium density (186666 plants/fed.) in the first and second seasons, respectively, followed by those sown at low density (140000 plants/fed.), and the lightest seed yield (kg/fed.) of 1265.65 and 1582.06 kg were obtained with dense density (210000 plants/fed.). These findings are consistent with those stated by **Zaimoglu *et al.* (2004), Soliman *et al.* (2015)** and **Murilo *et al.* (2022)**.

The effect of weed management strategies on seed yield (kg/fed.) at harvest was significant in the 2019 and 2020 seasons, as shown in Table (7). The plots that received Select super 250 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS) generated the greatest values of 1447.34 and 1809.18 kg in the first and second seasons, respectively. On contrary, the lowest values of 1308.73 and 1635.92 kg were produced for plots that had been hand-hoed twice (35 and 50 DAS) in the first and second

seasons, respectively. These findings are consistent with those of **Abbasi *et al.* (2006), Vitalkar *et al.* (2006)** and **Kale *et al.* (2015)**.

The interaction effect between the tillage system and weed control treatments showed significant impact on seed yield (kg/fed.) in 2020 season. The plots that received Select super 250 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS) under full-till generated the greatest value of 1937.95 kg in the second season. On the other hand, the plots treated with manual hoeing twice (35 and 50 DAS) under no-till had the lowest value of 1552.71 kg.

The interaction effect between plant density and weed control treatments had a highly significant and significant impact on seed yield (kg/fed.) for 2019 and 2020 seasons, respectively. The treatment of sowing 210000 plants per fed. plus spraying with Select super 250 ml per fed. (35 DAS) + Basagran 750 ml per fed. (50 DAS) recorded the heaviest weight (1798.14 kg) in the first season, but the highest one (2124.61 kg) in the second season was achieved with sowing 186666 plants per fed. plus Select super 250 ml per fed. (35 DAS) + Basagran 750 ml per fed. The lowest ones of 1194.68 and 1493.36 kg/fed. were achieved for plots that had been planted with 140000 plants/fed. and hand-hoed twice (35 and 50 DAS), in the first and second seasons, respectively.

The seed yield (kg/fed.) at harvest in the 2020 season was significantly impacted by the second order of interaction among the three studied factors. Plots sown at 186666 plants/fed. and received Select super 500 ml/fed. + Basagran 750 ml/fed. (35 DAS) under full-till system provided the highest values of 1736.53 and 2170.66 kg, while no-tilled plots sown at plant density of 210000 plants/fed. and received Select super 250 ml/fed. (35 DAS) + Basagran 750 ml/fed. (50 DAS) provided the lowest ones of 1107.62 and 1384.53 kg in the first and second seasons, respectively.

7. Straw yield/fed (kg):

The data in Table (8) show the mean straw yield (kg/fed.) at harvest in the 2019 and 2020 growing seasons as influenced by tillage techniques, plant densities, weed control treatments, and their interactions.

The results of the analysis of variance showed that tillage systems did not show significant impact on straw yield (kg/fed.) in 2019 and 2020 seasons. A slight increase in straw yield was detected due to full-till comparing to no-till in both growing seasons. These findings concur with those submitted by **Samarajeewa *et al.* (2006)** and **Cheţan *et al.* (2021).**

Plant population densities had a significant impact on straw yield (kg/fed.) throughout the seasons of 2019 and 2020 as shown in Table (8).The heaviest straw yield of 3019.12 and 3773.90 kg were obtained with medium plant density of 186666 plants/fed., followed by low plant density of 140000 plants/fed., then the lowest ones of 2531.30 and 3164.12 kg were obtained with dense density of 210000 plants/fed. In 2019 and 2020seasons, respectively. These findings coincide with those of

Harder *et al.* (2007) and **Menalled *et al.* (2022)**.

The effect of weeds control treatments on straw yield (kg/fed.) was significant in the 2019 and 2020 seasons, as shown in Table (8). Therefore, the plots that received Select super 250 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS) generated the greatest values of 2894.69 and 3618.36 kg. However, the lowest values of 2617.47 and 3271.84 kg, respectively, were obtained from plots that had been hand-hoed twice (35 and 50 DAS) in the first and second seasons. These outcomes align with those attained by **Mohajer *et al.* (2015)** and **Paudel *et al.* (2017)**.

The straw yield (kg/fed.) was significantly influenced by the interaction effect between the tillage system and weed control treatments in the 2020 season. The plots that received Select super 250 ml/fed. (35 DAS) plus Basagran 750 ml/fed. (50 DAS) under full-till generated the greatest values of straw yield (kg/fed.) 3100.72 and 3875.91 kg in the first and second, respectively. On the contrary, the lowest values of 2484.33 and 3105.42 kg were detected in no-till plots, either with Select super 500 ml/fed. + Basagran 750 ml/fed. (35 DAS) or with manual hoeing twice (35 and 50 DAS) in the first and second, respectively.

Straw yield (kg/fed.) was harvested significantly affected by the interaction effect between plant density and weed control treatments in the 2019 and 2020 growing seasons. It is worthy to note that the treatment of planting 186666 plants per fed. and spraying with Select super 250 ml per feeding (35 DAS) + Basagran 750 ml per feeding (50 DAS) produced the highest straw yield of 3399.38 and 4249.22 kg in the first and second seasons, respectively. Whereas the least ones of 2389.37 and 2986.72 kg were obtained in plots that planted with 140000 plants/fed. and hand-hoed twice (35 and 50 DAS) in the first and second seasons, respectively.

The straw yield (kg/fed.) at harvest in both the growing seasons of 2019 and 2020 did not significantly affected by the second order of interaction among the three factors under study.

CONCLUSION

For the best productivity of soybean per unit area, it could be recommended that the soil should be plowed before cultivation, sowing plants at a rate of 210.000 plants/fed. and spraying plants with Select super (500 ml/fed.) at 35 DAS + Basagran 750 (ml/fed.) at 50 DAS under experimental area condition of Minia Governorate

Table (1): Mechanical and chemical analyses of the surface soil at the experimental site in both growing seasons.

Soil character	Values	
	The 1st season (2019)	The 2nd season (2020)
Mechanical analysis		
Sand (%)	22.43	22.12
Silt (%)	30.59	31.13
Clay (%)	46.98	46.75
Soil texture	**Clay loam**	**Clay loam**
Chemical analysis		
Soil reaction pH	8.05	8.03
E.C. (m mohs/cm)	0.346	0.349
Organic matter (%)	1.46	1.47
Total nitrogen (%)	0.09	0.08
Available P (ppm)	21.3	21.1
Available K (ppm)	346.4	349.3

Table (2): Means of plant height (cm) at harvest as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	66.67	68.00	67.33	68.33	69.00	**67.87**	61.33	56.67	63.67	68.33	81.67	**66.33**
	B2	66.67	77.67	80.33	76.67	74.67	**75.20**	81.00	65.00	71.67	69.33	70.33	**71.47**
	B3	87.00	84.33	83.00	88.67	76.33	**83.87**	78.33	87.33	86.00	92.33	70.67	**82.93**
Mean		**73.44**	**76.67**	**76.89**	**77.89**	**73.33**	**75.64**	**73.56**	**69.67**	**73.78**	**76.67**	**74.22**	**73.58**
Full till	B1	64.00	67.67	71.33	68.00	69.67	**68.13**	64.00	70.00	68.33	71.67	78.33	**70.47**
	B2	69.00	68.00	69.00	70.67	68.33	**69.00**	80.67	81.67	84.00	80.00	85.67	**82.40**
	B3	83.00	87.00	86.00	85.00	88.00	**85.80**	62.33	93.33	85.00	96.67	100.67	**87.60**
Mean		**72.00**	**74.22**	**75.44**	**74.56**	**75.33**	**74.31**	**69.00**	**81.67**	**79.11**	**82.78**	**88.22**	**80.16**
Mean of B	B1	**65.33**	**67.83**	**69.33**	**68.17**	**69.33**	**68.00**	**62.67**	**63.33**	**66.00**	**70.00**	**80.00**	**68.40**
	B2	**67.83**	**72.83**	**74.67**	**73.67**	**71.50**	**72.10**	**80.83**	**73.33**	**77.83**	**74.67**	**78.00**	**76.93**
	B3	**85.00**	**85.67**	**84.50**	**86.83**	**82.17**	**84.83**	**70.33**	**90.33**	**85.50**	**94.50**	**85.67**	**85.27**
Mean of C		**72.72**	**75.44**	**76.17**	**76.22**	**74.33**	**74.98**	**71.28**	**75.67**	**76.44**	**79.72**	**81.22**	**76.87**
L.S.D. at 5%		**A: NS** **B:** 2.480** **C:** 2.398**			**AB:** 3.269** **AC: NS** **BC: NS** **ABC:** 5.996*			**A:** 0.912** **B:** 8.766** **C: NS**			**AB:** 10.125** **AC:** 8.414* **BC:** 12.878** **ABC: NS**		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.
C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

Table (3): Means number of branches at harvest as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	3.20	3.20	5.07	3.73	4.00	**3.84**	4.00	4.00	6.33	4.67	5.00	**4.80**
	B2	3.47	3.73	3.47	2.40	2.40	**3.09**	4.33	4.67	4.33	3.00	3.00	**3.87**
	B3	2.67	1.87	2.40	2.40	2.40	**2.35**	3.33	2.33	3.00	3.00	3.00	**2.93**
Mean		**3.11**	**2.93**	**3.64**	**2.84**	**2.93**	**3.09**	**3.89**	**3.67**	**4.56**	**3.56**	**3.67**	**3.87**
Full till	B1	3.73	4.53	4.00	3.73	4.53	**4.11**	4.67	5.67	5.00	4.67	5.67	**5.13**
	B2	4.00	3.47	3.20	3.20	4.00	**3.57**	5.00	4.33	4.00	4.00	5.00	**4.47**
	B3	2.13	1.87	2.67	2.40	2.40	**2.29**	2.67	2.33	3.33	3.00	3.00	**2.87**
Mean		**3.29**	**3.29**	**3.29**	**3.11**	**3.64**	**3.32**	**4.11**	**4.11**	**4.11**	**3.89**	**4.56**	**4.16**
Mean of B	B1	**3.47**	**3.87**	**4.53**	**3.73**	**4.27**	**3.97**	**4.33**	**4.83**	**5.67**	**4.67**	**5.33**	**4.97**
	B2	**3.73**	**3.60**	**3.33**	**2.80**	**3.20**	**3.33**	**4.67**	**4.50**	**4.17**	**3.50**	**4.00**	**4.17**
	B3	**2.40**	**1.87**	**2.53**	**2.40**	**2.40**	**2.32**	**3.00**	**2.33**	**3.17**	**3.00**	**3.00**	**2.90**
Mean of C		**3.20**	**3.11**	**3.47**	**2.98**	**3.29**	**3.21**	**4.00**	**3.89**	**4.33**	**3.72**	**4.11**	**4.01**
L.S.D. at 5%		**A**: NS **B**: 0.425** **C:** NS			**AB**: NS **AC:** NS **BC:** NS **ABC**: NS			**A:** NS **B:** 0.531** **C:** NS			**AB:** NS **AC:** NS **BC:** NS **ABC:** NS		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.

C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

Table (4): Means of pods number at the age of 65 days as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	25.33	27.20	33.07	35.20	36.00	**31.36**	16.33	21.00	30.33	23.33	25.67	**23.33**
	B2	30.93	32.27	30.67	34.13	33.07	**32.21**	29.17	17.50	30.33	34.83	30.33	**28.43**
	B3	26.67	24.53	27.20	28.27	24.00	**26.13**	28.00	24.73	22.17	16.80	18.67	**22.07**
Mean		**27.64**	**28.00**	**30.31**	**32.53**	**31.02**	**29.90**	**24.50**	**21.08**	**27.61**	**24.99**	**24.89**	**24.61**
Full till	B1	36.80	36.80	36.53	37.87	37.07	**37.01**	27.83	34.07	35.47	26.37	26.37	**30.02**
	B2	33.87	31.47	32.27	33.87	33.07	**32.91**	37.33	38.50	32.67	33.83	32.90	**35.05**
	B3	28.53	29.60	32.00	31.20	33.33	**30.93**	33.13	32.20	29.87	33.37	33.13	**32.34**
Mean		**33.07**	**32.62**	**33.60**	**34.31**	**34.49**	**33.62**	**32.77**	**34.92**	**32.67**	**31.19**	**30.80**	**32.47**
Mean of B	B1	**31.07**	**32.00**	**34.80**	**36.53**	**36.53**	**34.19**	**22.08**	**27.53**	**32.90**	**24.85**	**26.02**	**26.68**
	B2	**32.40**	**31.87**	**31.47**	**34.00**	**33.07**	**32.56**	**33.25**	**28.00**	**31.50**	**34.33**	**31.62**	**31.74**
	B3	**27.60**	**27.07**	**29.60**	**29.73**	**28.67**	**28.53**	**30.57**	**28.47**	**26.02**	**25.08**	**25.90**	**27.21**
Mean of C		**30.36**	**30.31**	**31.96**	**33.42**	**32.76**	**31.76**	**28.63**	**28.00**	**30.14**	**28.09**	**27.84**	**28.54**
L.S.D. at 5%		**A:** NS **B:** 1.557** **C:** 1.984**			**AB:** 4.562** **AC:** NS **BC:** NS **ABC:** 5.493**			**A:** 10.121* **B:** NS **C:** NS			**AB:** NS **AC:** NS **BC:** NS **ABC:** NS		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.
C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

Table (5): Means of 100 seed weight as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	14.94	14.39	13.47	15.79	13.87	**14.49**	18.68	17.99	16.84	19.73	17.34	**18.12**
	B2	13.55	14.52	13.61	13.88	13.58	**13.83**	16.94	18.15	17.01	17.35	16.97	**17.28**
	B3	13.84	12.23	13.97	12.46	12.02	**12.90**	17.30	15.28	17.47	15.58	15.03	**16.13**
Mean		**13.16**	**14.04**	**14.11**	**13.71**	**13.68**	**13.74**	**17.64**	**17.14**	**17.11**	**17.55**	**16.45**	**17.18**
Full till	B1	14.36	16.48	16.67	15.00	15.37	**15.58**	17.95	20.60	20.84	18.75	19.21	**19.47**
	B2	13.45	16.43	13.85	14.63	15.25	**14.72**	16.81	20.54	17.31	18.29	19.07	**18.40**
	B3	13.01	13.62	12.98	13.56	14.15	**13.47**	16.26	17.03	16.23	16.95	17.68	**16.83**
Mean		**13.61**	**15.51**	**14.50**	**14.40**	**14.92**	**14.59**	**17.01**	**19.39**	**18.13**	**18.00**	**18.65**	**18.24**
Mean of B	B1	**14.65**	**15.44**	**15.07**	**15.39**	**14.62**	**15.03**	**18.31**	**19.29**	**18.84**	**19.24**	**18.27**	**18.79**
	B2	**13.50**	**15.48**	**13.73**	**14.26**	**14.42**	**14.28**	**16.87**	**19.35**	**17.16**	**17.82**	**18.02**	**17.84**
	B3	**13.42**	**12.93**	**13.48**	**13.01**	**13.08**	**13.18**	**16.78**	**16.16**	**16.85**	**16.26**	**16.35**	**16.48**
Mean of C		**14.04**	**14.22**	**14.09**	**14.61**	**13.86**	**14.17**	**17.32**	**18.27**	**17.62**	**17.78**	**17.55**	**17.71**
L.S.D. at 5%		**A**: NS **B**: 0.843** **C**: 0.447**			**AB**: NS **AC**: 0.795** **BC**: 1.034** **ABC**: 1.390**			**A**: NS **B**: 1.054** **C**: 0.559*			**AB**: NS **AC**: 0.994** **BC**: 1.293** **ABC**: 1.739**		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.

C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

Table (6): Means of seed yield/plant (g) as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	22.61	23.79	22.93	21.49	21.33	**22.43**	28.27	29.73	28.67	26.87	26.67	**28.04**
	B2	25.76	23.84	23.04	24.16	22.88	**23.94**	32.20	29.80	28.80	30.20	28.60	**29.92**
	B3	20.53	22.99	23.89	22.83	21.81	**22.41**	25.67	28.73	29.87	28.53	27.27	**28.01**
Mean		**22.97**	**23.54**	**23.29**	**22.83**	**22.01**	**22.93**	**28.71**	**29.42**	**29.11**	**28.53**	**27.51**	**28.66**
Full till	B1	24.80	28.21	23.47	24.32	25.87	**25.33**	31.00	35.27	29.33	30.40	32.33	**31.67**
	B2	25.87	26.88	26.03	25.12	27.31	**26.24**	32.33	33.60	32.53	31.40	34.13	**32.80**
	B3	25.12	22.13	22.56	22.29	23.25	**23.07**	31.40	27.67	28.20	27.87	29.07	**28.84**
Mean		**25.26**	**25.74**	**24.02**	**23.91**	**25.48**	**24.88**	**31.58**	**32.18**	**30.02**	**29.89**	**31.84**	**31.10**
Mean of B	B1	**23.71**	**26.00**	**23.20**	**22.91**	**23.60**	**23.88**	**29.63**	**32.50**	**29.00**	**28.63**	**29.50**	**29.85**
	B2	**25.81**	**25.36**	**24.53**	**24.64**	**25.09**	**25.09**	**32.27**	**31.70**	**30.67**	**30.80**	**31.37**	**31.36**
	B3	**22.83**	**22.56**	**23.23**	**22.56**	**22.53**	**22.74**	**28.53**	**28.20**	**29.03**	**28.20**	**28.17**	**28.43**
Mean of C		**24.12**	**24.64**	**23.65**	**23.37**	**23.74**	**23.90**	**30.14**	**30.80**	**29.57**	**29.21**	**29.68**	**29.88**
L.S.D. at 5%		**A:** 2.214* **B:** 0.915** **C:** NS			**AB:** 1.719* **AC:** NS **BC:** NS **ABC:** 2.921*			**A:** 2.767* **B:** 1.144** **C:** NS			**AB:** 2.149* **AC:** NS **BC:** NS **ABC:** NS		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.

C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

Table (7): Means of seed yield/fed (kg) as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	1440.85	1257.81	1417.38	1281.28	1229.65	**1325.39**	1801.06	1573.26	1771.73	1601.60	1537.06	**1656.74**
	B2	1347.45	1667.54	1332.90	1497.17	1304.74	**1429.96**	1684.32	2084.42	1666.13	1871.46	1630.93	**1787.45**
	B3	1209.47	1107.62	1163.94	1182.72	1192.10	**1171.17**	1511.84	1384.53	1454.93	1478.40	1490.13	**1463.96**
Mean		**1332.59**	**1344.32**	**1304.74**	**1320.39**	**1242.16**	**1308.84**	**1665.74**	**1680.40**	**1630.93**	**1650.48**	**1552.71**	**1636.05**
Full till	B1	1522.98	1628.58	1591.04	1307.09	1159.72	**1441.88**	1903.73	2035.73	1988.80	1633.86	1449.65	**1802.35**
	B2	1595.73	1731.84	1736.53	1342.29	1539.41	**1589.16**	1994.66	2164.80	2170.66	1677.86	1924.26	**1986.45**
	B3	1337.60	1290.66	1276.58	1469.01	1426.77	**1360.12**	1672.00	1613.33	1595.73	1836.26	1783.46	**1700.16**
Mean		**1485.44**	**1550.36**	**1534.72**	**1372.80**	**1375.30**	**1463.72**	**1856.80**	**1937.95**	**1918.40**	**1716.00**	**1719.12**	**1829.65**
Mean of B	B1	**1481.92**	**1443.20**	**1504.21**	**1294.18**	**1194.68**	**1383.64**	**1852.40**	**1804.00**	**1880.26**	**1617.73**	**1493.36**	**1729.55**
	B2	**1471.59**	**1699.69**	**1534.72**	**1419.73**	**1422.08**	**1509.56**	**1839.49**	**2124.61**	**1918.40**	**1774.66**	**1777.60**	**1886.95**
	B3	**1273.53**	**1798.14**	**1220.26**	**1325.86**	**1309.44**	**1265.65**	**1591.92**	**1498.93**	**1525.33**	**1657.33**	**1636.80**	**1582.06**
Mean of C		**1409.01**	**1447.34**	**1419.73**	**1346.59**	**1308.73**	**1386.28**	**1761.27**	**1809.18**	**1774.66**	**1683.244**	**1635.92**	**1732.85**
L.S.D. at 5%		**A**: NS **B**: 39.71* **C**: 47.56**			**AB**: NS **AC**: NS **BC**: 14.13** **ABC**: NS			**A**: 10.69* **B**: 99.64* **C**: 84.45*			**AB**: NS **AC**: 88.54* **BC**: 92.66* **ABC**: 66.57*		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.

C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

Table (8): Means of straw yield (kg) as affected by tillage system, plant density, weed control treatments and their interaction in 2019 and 2020 seasons.

Tillage system	Plant density	First season of 2019.						Second season of 2020.					
		Weed control treatments					Mean	Weed control treatments					Mean
		C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	
No till	B1	2881.70	2515.62	2834.77	2562.56	2459.30	**2650.79**	3602.13	3144.53	3543.46	3203.20	3074.13	**3313.49**
	B2	2694.91	3335.08	2665.81	2994.34	2609.49	**2859.92**	3368.64	4168.85	3332.26	3742.93	3261.86	**3574.91**
	B3	2418.94	2215.25	2327.89	2365.44	2384.21	**2342.34**	3023.68	2769.06	2909.86	2956.80	2980.26	**2927.93**
Mean		**2665.18**	**2688.65**	**2609.49**	**2640.78**	**2484.33**	**2617.69**	**3331.48**	**3360.81**	**3261.86**	**3300.97**	**3105.42**	**3272.11**
Full till	B1	3045.97	3257.17	3182.08	2614.18	2319.44	**2883.77**	3807.46	4071.46	3977.60	3267.73	2899.30	**3604.21**
	B2	3191.46	3463.68	3473.06	2684.58	3078.82	**3178.32**	3989.33	4329.60	4341.33	3355.73	3848.53	**3972.90**
	B3	2675.20	2581.33	2553.17	2938.02	2853.54	**2720.25**	3344.00	3226.66	3191.46	3672.53	3566.93	**3400.32**
Mean		**2970.88**	**3100.72**	**3069.44**	**2745.60**	**2750.60**	**2927.45**	**3713.60**	**3875.91**	**3836.80**	**3432.00**	**3438.25**	**3659.31**
Mean of B	B1	**2963.84**	**2886.40**	**3008.42**	**2588.37**	**2389.37**	**2767.28**	**3704.80**	**3608.00**	**3760.53**	**3235.46**	**2986.72**	**3459.10**
	B2	**2943.18**	**3399.38**	**3069.44**	**2839.46**	**2844.16**	**3019.12**	**3678.98**	**4249.22**	**3836.80**	**3549.33**	**3555.20**	**3773.90**
	B3	**2547.07**	**2398.29**	**2440.53**	**3651.73**	**2618.88**	**2531.30**	**3183.84**	**2997.86**	**3050.66**	**3314.66**	**3273.60**	**3164.12**
Mean of C		**2818.03**	**2894.69**	**2839.46**	**2693.19**	**2617.47**	**2772.57**	**3522.54**	**3618.36**	**6549.33**	**3366.48**	**3271.84**	**3465.71**
L.S.D. at 5%		**A**: NS **B**: 79.43* **C**: 95.12*			**AB**: NS **AC**: 21.68* **BC**: 28.26* **ABC**: NS			**A**: NS **B**: 99.28* **C**: 68.90*			**AB**: NS **AC**: 77.09* **BC**: 85.33* **ABC**: NS		

Where: b1: 140.000 plant/fed., b2: 186.666 plant/fed. and b3: 210.000 plant/fed.
C1: Select super (250 ml) + Basagran (750 ml) (35 DAS), C2: Select super (250 ml) (35 DAS) + Basagran (750 ml) (50 DAS), C3: Select super (500 ml) + Basagran (750 ml) (35 DAS), C4: Select super (500 ml) (35 DAS) + Basagran (750 ml) (50 DAS) and C5: hand hoeing twice (35 and 50 DAS).

REFERENCES

Abbasi, R.; Alizadeh, H.M.; Khanghah, H.Z. and Jahromi, K.T. (2006). Integration of mechanical methods and herbicides in contolling weeds of soybean (*Glycin max*). 15th Australian Weeds Conference, Papers and Proceedings, Adelaide, South Australia, 24-28 September, Managing Weeds in a Changing Climate. 423-425.

Acharya, B.S.; Dodla, S.; Gaston, L.A.; Darapuneni, M.; Wang, J.J.; Sepat, S. and Bohara, H. (2019). Winter cover crops effect on soil moisture and soybean growth and yield under different tillage systems. Soil and Tillage Research, 195, 104430.

Argenta, G.; Silva, P.R.F. and Sangol, L. (2001). Arranjo de plantas em milho: análise do estado da-arte. Ciência Rural, 31: 1075-1084.

Barberi, P. (2003). Preventive and cultural methods for weed management. In: Labrada R (Ed). Weed management for developing countries. FAO Plant Production and Protection Paper, 120: 179-194.

Chapman, D.H and Pratt, P.F. (1961). Methods of Analysis for Soils, Plants and Water. University of California, Riverside: Division of Agricultural Science, USA.

Cheţan, F.; Cheţan, C.; Bogdan, I.; Pop, A.I.; Moraru, P.I. and Rusu, T. (2021). The effects of management (tillage, fertilization, plant density) on soybean yield and quality in a three-year experiment under transylvanian plain climate conditions. Land, 10 (2): 200.

Eyherabide, J.J. and Cendoya, M.G. (2002). Critical period of weed control in soybean for full field and in-furrow interference. Weed Sci., 50: 162-166.

Gozubuyuk, Z.; Sahin, U. and Celik, A. (2020). Operational and yield performances and fuel-related CO_2 emissions under different tillage-sowing practices in a rainfed crop rotation. International Journal of Environmental Science and Technology, 17 (11): 4563–76.

Harder, D.; Sprague, C. and Renner, K. (2007). Effect of soybean row width and population on weeds, crop yield, and economic return. Weed Technology, 21 (3): 744-752.

Hassan, A.A. (2015). Study of some herbicides and plant density on the growth and soybean yield. Res. J. Pharm. Biologic. Chemic. Sci., 6 (1): 115-126.

Horowitz, J.; Ebel, R. and Ueda, K. (2010). No-till farming is a growing practice. Bull. No. 70, USDA-ERS, Washington, DC.

Kale, R.V.; Pau, S.A. l; Shelke, R.T. and Chimote, A.N. (2015). Effect of different post emergence herbicides on weed management in soybean (*Glycine max*, L.). Res. J. Agric. Sci., 6 (5): 1159-1160.

Khajouci-Nejad, G.; Kazemi, H.; Alyari, H. and Javanshir, A.M.J. (2004). Irrigation regimes and plant population density effects on seed yield, protein and oil content of three soybean cultivars. Turkish Journal of Field Crops, 9 (2): 62-71.

Khan, A.Z.; Shah, P.; Khalil, S.K. and Taj, F.H. (2003). Influence of

planting date and plant density on morphological traits of determinate and indeterminate soybean cultivars under temperate environment. Pakistan Journal of Agronomy, 2 (3): 146-152.

Kunz, C.; Weber, J.F. and Gerhards, R. (2015). Benefits of precision farming technologies for mechanical weed control in soybean and sugar beet—Comparison of precision hoeing with conventional mechanical weed control. Agronomy, 5 (2): 130-142.

Kwaw, D. and Al-Kaisi, M. (2006). Tillage and nitrogen source and rate effect on corn response in corn-soybean rotation. Agron. J., 98: 507-513.

Lal, R. (2009). The plow and agricultural sustainability. J. Sustain. Agric., 33: 66–84.

Lal, S.; Dubey R.P.; Das, G.K. and Suryavanshi, T. (2017). Effect of sequential application of post-emergence herbicides on weeds and productivity of soybean. In: Proceedings of Biennial Conference on "Doubling Farmers" Income by 2022: The Role of Weed Science", 1-3 March, Udaipur. Indian Society of Weed Science, Jabalpur, India. pp: 126.

Mangalassery, S.; Sjögersten, S.; Sparkes, D.L.; Sturrock, C.J. Craigon, J. and Mooney, S.J. (2014). To what extent can zero tillage lead to a reduction in greenhouse gas emissions from temperate soils? Scientific Reports, 4: 4586.

Menalled, U.D.; Adeux, G.; Cordeau, S.; Smith, R.G.; Mirsky, S.B. and Ryan, M.R. (2022). Cereal rye mulch biomass and crop density affect weed suppression and community assembly in no‐till planted soybean. Ecosphere, 13 (6), e4147.

Moghadam, Z. H.; Paseban, M. and Sedigh, E. (2010). Effect of weeding time of velvetleaf on yield and component yield of soybean. In Proceedings of 3rd Iranian Weed Science Congress, Volume 1: Weed biology and ecophysiology, Babolsar, Iran, 17-18 February 2010 (pp. 373-378). Iranian Society of Weed Science.

Mohajer, S.; Taha, R.M.; Ahmad, A.B.A. and Elaagib, E. (2015). Effect of different herbicides on seed yield and physiological aspects in soybean (*Glycine Max* L.). Chapter 6 In: Recent Advances in Medicinal Plants and Their Cultivation. 1st Edition, Manglam Publication. New Delhi, India.

Moshiur, R.; Mosharrof, H.; Parvez, A. and Abdul-Shukor, J. (2011). Plant density influence on yield and nutritional quality of soybean seed. Asian J. of plant Sciences, 10 (2): 125-132.

Murilo, M.D.; Luis, S.; Clovis, A.S.; Vander, O.; Marcos, C.M.J.; Hugo, F.K. and Lucieli, S.L. (2022). Soybean tolerance to defoliation at the beginning of pod formation as affected by plant density. Rev. Ceres, Vicosa, 69 (4): 408-415.

Nunes, M.R.; van Es, H.M.; Schindelbeck, R.; Ristow, A.J. and Ryan, M. (2018). No-till and cropping system diversification

improve soil health and crop yield. Geoderma, 328: 30-43.

Pagano, M.C. and Miransari, M. (2016). The importance of soybean production worldwide. In Abiotic and biotic stresses in soybean production (pp. 1-26). Academic Press.

Paudel, P.; Singh, R.S.; Pandey, I.B. and Prasad, S.S. (2017). Effect of different weed management practices on weed dynamic, yield and economics of soybean production. Azarian J. Agric., 4 (2): 54-59.

Ranđelović, P.; Đorđević, V.; Milić, S.; Balešević-Tubić, S.; Petrović, K.; Miladinović, J. and Đukić, V. (2020). Prediction of soybean plant density using a machine learning model and vegetation indices extracted from RGB images taken with a UAV. Agronomy, 10 (8), 1108.

Samarajeewa, K.B.D.P.; Horiuchi, T. and Oba, S. (2006). Finger millet (*Eleucin corocana* L. Gaertn.) as a cover crop on weed control, growth and yield of soybean under different tillage systems. Soil and Tillage Research, 90 (1/2): 93-99.

Sharief, A.E.; Sultan, M.S.; Ghonema, M.H. and El-Kamshishy, S.S. (2003). Response of soybean (*Glycin max* (L.) Merr.) to plant distribution and micro elements foliar spraying. J. Agric. Sci., Mansoura Univ., 28 (3): 1621-1630.

Soliman, I.E.; Morsi, A.R. and Khaffagy, A.E. (2015). Effect of competitive abilities of some soybean genotypes, plant densities and weed control treatments on soybean (*Glycine max* L.) and it's associated weeds. Journal of Plant production, 6 (8): 1413-1429.

Steel, R.G.D. and Torrie, J.H. (1980). Principles and procedures of statistics. A biometrical approach. 2nd edition. McGraw-Hill, New York, p. 384.

Sundari, A. (2003). Effect of date of sowing, plant density and phosphorus levels on the growth of soybean. Journal of Ecobiology, 15 (6): 431-436.

Sweeney, D.W. (2017). Twenty years of grain sorghum and soybean yield response to tillage and N fertilization of a claypan soil. Crop Forage and Turfgrass Management, 3: 1-7.

Sweeney, D.W.; Diaz, D.A.R.; Pedreira, B.C. and Havlin, J.L. (2022). Long-term yield response of corn, wheat, and double-crop soybean to tillage and N placement. Agronomy Journal, 114: 1000-1010.

Vetsch, J.A.; Randall, G.W. and Lamb, J.A. (2007). Corn and soybean production as affected by tillage systems. Agron. J., 99: 952-959.

Vitalkar, P.N.; Pawar, W.S.; Kuchanwar, O.D. and Farkade, B.K. (2006). Effect of spacing, herbicides and cultural practices on weed control in Kharif soybean. Journal of Soil and Crops, 16 (1): 258-260.

Zaimoglu, B.; Arioglu, H. H. and Arslan, M. (2004). Effect of seed quality on plant population and seed yield of double cropped soybean in the Mediterranean region of Turkey. Asian J. Plant Sci., 3: 574-577.

الملخص العربي.

تأثر صفات المحصول ومكوناته لفول الصويا بمعاملات نُظم الخدمة والكثافة النباتية ومكافحة الحشائش.

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لدراسة تأثير معاملات نظام الخدمة ، والكثافة النباتية ، ومكافحة الحشائش والتفاعل فيما بينها على خصائص الحشائش ، وصفات المحصول لفول الصويا (Glycine max, L., Merrill) صنف. جيزة 111 ، أجريت تجربتان حقليتان بالمزرعة البحثية بكلية الزراعة – جامعة المنيا، خلال الموسمين المتتاليين لعامي 2019 و 2020.

أوضحت النتائج أن نظام الخدمة الكاملة عزز جميع صفات المختبرة (ارتفاع النبات ، عدد الأفرع لكل نبات ، عدد القرون للنبات ، وزن الـ 100 بذرة ، محصول البذور للنبات وللفدان ، محصول القش) مقارنة بعدم الخدمة في كلا الموسمين، وأدت زراعة النباتات بمعدل 140000 نبات / فدان إلي الحصول علي أعلى القيم لعدد الأفرع للنبات ، عدد القرون للنبات ، وزن الـ 100 حبة ، بينما أنتجت الزراعة بمعدل 186666 نبات / فدان أثقل الأوزان لمحصول البذور للنبات وللفدان وكذلك لمحصول القش في كلا الموسمين. أدي استخدام سيلكت سوبر بمعدل 500 مل / فدان (بعد 35 يوم من الزراعة) + البازجران بمعدل 750 مل / فدان (بعد 50 يوم من الزراعة) إلي الحصول علي أطول النباتات وأكبر عدد للقرون / النبات ووزن الـ 100 بذرة، بينما أدي استخدام سيلكت سوبر بمعدل 250 مل / فدان (بعد 35 يوم من الزراعة) + البازجران بمعدل 750 مل / فدان (بعد 50 يوم من الزراعة) إلي الحصول علي أعلي محصول للبذور سواء للنبات أو للفدان وكذلك محصول القش، ويمكن القول بأنه من أجل الحصول علي أفضل إنتاجية لفول الصويا يجب اتباع نظام الخدمة الكامل مع زراعة النباتات بمعدل 186666 نبات / فدان ومعاملة النباتات بـ سيلكت سوبر بمعدل 250 مل / فدان (بعد 35 يوم من الزراعة) + البازجران بمعدل 750 مل / فدان (بعد 50 يوم من الزراعة).

الكلمات المفتاحية: فول الصويا ، مكونات المحصول ، الخدمة ، الكثافة النباتية ، المحصول.