Effect of some seedbed preparation practices on the growth and yield of soybean

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Two field experiments were conducted on a clay loam soil at the Agricultural Research and Experiment Center of the Faculty of Agriculture at Moshtohor, during 1991 and 1992 seasons to study the effect of different practices of seedbed, preparation, mechanical weed control and their interaction on soybean yield, weeddensity and some soil properties.Nine seeded preparation treatments were evaluated, they are:1.Zero-tillage or no-tillage.2.Chisel plowing (once).3.Chisel plowing (once) + disc harrowing.4.Chisel plowing (twice).5.Chisel plowing (twice) + disc harrowing. 6.Mold-board plowing (once).7.Mold-board plowing (once) + disc harrowing. 8 Mold-board plowing (twice).9. Mold-board plowing (twice) + disc harrowing. Three weed control treatments were compared, namely : 1.Unweeding. 2.One hand hoeing at 3 weeks from planting.3.Two hand hoeings, the first at 3 weeks from planting and the second two weeks later. The soil was fertilized with 30 kg P205/fed as calcium superphosphate (15% P2O5) and 24 kg K2O as p,),..L.,sium sulphate (48% K2O) during seedbed preparation.The commonly known ”Herati” method or wet method of sowing was used for planting soybean. In this method, seeds were drilled in the moderately moistsoil in ridges 60 cm apart. In zero tillage treatment, seeds were hand drilled in COWS. Seeds were inoculated at sowing with the N fixing bacteria (Brady japonicum). Planting date was May 10, and May 5 in the first and second seasons, respectively. A starter dose of 15 kg N/fed as urea (46% N) was added after 10 days from planting.Clark variety, maturity group IV was used at a seedling rate of 45 kg/fed. Plants were thinned at 5 cm after two weeks. The design of the experiment was a strip split plot design with four replications. The strips were assigned to the 9 seedbed preparation treatments, and the subplots for the 3 hand hoeing treatments. The subplot area was 21 square meters. Soybean was preceded by Egyptian clover in both seasons. The characters studied included : Soil properties including soil bulk density, and soil porosity percentage at planting as well as at harvest. Also, soil salinity was estimated at planting. Growth characters, at 60 days from planting, as well as at harvest, were estimated from a 10-plants sample.Seed yield and its components were recorded. Also, weed density (g/m2) was recorded at 3 and 5 weeks from planting as well as at harvest. Economic evaluation was made by estimating the effect of different seedbed preparation practices and hoeing treatments on variable costs, total costs, net farm return and net return per one invested pound. Combined analysis was made for the two seasons.tooResults could be summarized as follows:Growth characters : 1.Seedbed preparation practices, hand hoeing treatments and their interaction had no significant effect on plant height at 60 days from planting. Plant height at harvest was not significantly affected by seedbed preparation and weed control treatments. The interaction between seedbed preparation and hoeing treatments significantly affected plant height at harvest. The tallest plants (96.20 cm) were those of the mold-board plowing (twice) + disc harrowing combined with two hoeings and the shortest ones (80.1 cm) were those of zero-tillage combined with unweeding.3.Number of branches per plant 60 days after planting,as well as at harvest were not significantly affected by seedbed preparation, hoeing and their interaction.4.Dry weight of branches per plant 60 days after planting was not significantly affected by seedbed preparation treatments.Hoeing once increased dry weight of branches per plant at 60 days compared with unweeding or hoeing twice by 14.74 and 11.76%, respectively. Also, the interaction between both experimental factors significantly affected this trait. The highest value was

recorded with chisel plow (twice) combined with 2 hoeings.5.Neither seedbed preparation nor weed control treatments significantly affected number of leaves per plant at 60 days from planting. The interaction between seedbed preparation and hand hoeing significantlyaffected this traits. The greatest number of leaves per plant was 34.0, produced by chisel plowing (twice) combined with two hoeings.6.Dry weight of leaves per plant 60 days after planting was not significantly affected by seedbed preparation, hand hoeing and their interaction.7.Number and dry weight of pods per plant 60 days after planting showed no significant response to the different seedbed preparation practices, hand hoeing treatments and their interaction combined over both seasons.8.Root length of soybean plants 60 days after planting averaged over 1991 and 1992 seasons was not significantly affected by either seedbed preparation or hand hoeing. whereas, the effect of the interaction between both experimental factors significantly affected this trait. The highest root length was recorded with mold board plowing (twice) + disc harrowing combined with 2 hoeings, being 27.7 cm.9.Dry weight of roots per plant at 60 days from planting was significantly affected by seedbed preparation treatments. Zero tillage treatment favourably affected this trait. Neither hand hoeing, nor the interaction between both experimental factors significantly influenced this character.10.Number of pods per plant at harvest, seed yield per plant and seed index of soybean were not significantly affected by seedbed preparation, hand hoeing and their interaction.11.Seedbed preparation practices significantly affected seed yield of soybean per feddan averaged over 1991 and 1992 seasons.The highest seed yield per feddan was obtained by mold-board plowing (once) + disc harrowing followed by mold-board plowing (twice) + disc harrowing, mold-board plowing (once) and mold-board plowing (twice). These four treatments did not significantly differ in their seed yield per feddan. These four treatments were followed by the four chisel plowing treatments which were also similar in their effect on seed yield per feddan. The worst treatment was that of zero tillage where the seed yield was reduced by 53.20% compared with the best treatment.Hand hoeing twice significantly increased seed yield by 5.16 and 10.42% compared with one hoeing and unweeding, respectively. The interaction between both experimental factors had no significant effect on soybean seed yield 12.Seedbed preparation treatments significantly affected weed density at early stages of growth (21 days from planting). Plowing reduced weed growth compared with zero tillage. All treatments were superior to zero tillage in depressing weeds.13.Weed density 5 weeks after planting was significantly influenced by seedbed preparation practices. Plowing either with chisel or mold-board plow significantly depressed weed infestation Hoeing depressed weed growth 5 weeks after planting. About 75% of the weed population was controlled due to hoeing once.No significant interaction was observed between both experimental factors on weed density 5 weeks after planting.14.Seedbed preparation had significant effect on weed density at harvest. The four mold-board plowing treatments were significantly superior to zero tillage in depressing weed spread at harvest. Also, chisel plowing reduced weed density compared with zero tillage.Hand hoeing significantly reduced weed density at harvest compared with unweeding. No significant interaction was observed between both experimental factors on weed density at harvest.I 5 Bulk density of soil before planting soybean as well as at harvest was not significantly affected by seedbed preparation treatments in both seasons and at different depths. The bulk density as well as real density were significantly increased with increasing soil depth from 10 to 20 and 30 cm in both seasons and before planting as well as at harvest. Hoeing treatments did not significantly affect bulk density at harvest in bothseasons.16.Soil pore spaces percentage was not significantly affected by seedbed preparation treatments, either before planting or at harvest as well as in both seasons of experimentation. Also, hand hoeing treatments had no significant effect on soil porosity at harvest in both seasons.17.Soil salinity expressed as electric conductivity was significantly influenced by seedbed preparation treatments in both seasons. In both seasons, the lowest salinity values were those of chisel plowing (once or twice) and the highest values were those of mold-board plowing (once or twice).18.The economic evaluation revealed that the variable costs of soybean production averaged over 1991 and 1992 seasons varied from 153 L.E./fed for zero-tillage treatment to 235 L.E./fed for mold board plowing (twice) + disc harrowing. The total costs ranged between 353 L.E./fed for zero-tillage treatment and 435 L.E./fed for mold-board plowing (twice) + disc harrowing.19.The percentage of costs of seedbed preparation to the total costs of soybean

production per feddan ranged between 5.46% for the zero-tillage treatment to 33.34% for the mold board plowing (twice) + disc harrowing (for zero-tillage the costs here are paid for hand hoeing).20.The net farm return of soybean production reached a maximum of 588.83 L.E.with mold board plowing (once) + disc harrowing on the twoseasons average. The minimum net farm return was 315.67 L.E./fed produced by zero-tillage treatment. Higher net farm return was obtained by mold board plowing. With chisel plowing, the net farm return was increased when it was followed by harrowing and with frequent plowing. 21.The net return per one invested L.E. reached a maximum of 1.407 L.E. for the best treatment including mold-board plowing (once) + disc harrowing and a minimum of 0.882 L.E. for zero-tillage.22.Hand hoeing increased net farm return per feddan by 22.55 and 45.05 L.E. as a result of one and two hoeings, respectively compared with the unweeded control.23.The ideal treatment was that including mold-board plowing (once) + disc harrowing combined with two hand hoeings, where the net return valued 710.5 L.E./Fed.