

Development of a combined tillage planting machine for row crops

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ABSTRACT Conservation tillage „Tactics, which Include becoming more widely spread due to their effectiveness in reducing energy requirement, and in conserving moisture in arid area Strip tillage, as a component of minimum tillage, may be a viable management technique for Egyptian Agriculture. Farmers in Egypt need enhance to adopt this method to decrease fuel consumption, improve soil structure and fertility, m strip till- g system under environment for soil microorganisms, and maximize yield. Develop plantin ent of a Egyptian conditions was investigated in this study. p Three prototypes of a single unit till-plantin under soil bin, and field conditions. Data were g ystem were fabricated , and tested collected for degree of soil loosenin draft, soil mean weight seed lndiameter g, vertical separation between seed and fertilizer, and compaction. g emergence at different levels of speeds, depths, soil moisture, and soil Triaxial tests were conducted to measure soil shear strength parameters which used in theoretical soil cohesion (C), and angle of internal friction (0). The results of these tests were analysis to predict draft for individual cunder soil bin components of till-plantin nable with the g unit conditions. Theoretical results indicated that there was a reaso agreement in the values of the absolute velocity angle of coulter resulted fro m tests, and Predicted predicted values at different depths, and at various levels of soil draft for plow share moisture content, forms, and packer wheel configurations showed similar trends as measured draft Two parameters were used to evaluate the tillage quality of the three till-planting units under this study. These included the degree of soil loosening, and the soil mean weight diameter. Unit one resulted in the highest values of the degree of soil loosening followed by unit three, and unit two, respectively. However, the lowest values of the soil mean weight diameter were obtained with unit three, and there was no significant difference in the soil mean weight diameter between unit one and unit two. Unit two resulted in the highest values for the power per unit operating depth, the distance between seed and fertilizer, and seedling emergence followed by unit one, and unit three, respectively. The soil bin results showed an agreement with the field results for all measurements under this study. This indicated that the data from soil bin tests could be considered as a good indicator for estimation of parameters under field conditions. This approach would avoid the need for field tests in designing and improving tillage tools. Based on soil bin, and field tests, the following components of till-planting unit would be beneficial for Egyptian conditions; • Double rolling coulters to limit the row cultivation to a strip of 150 mm width. • Sweep share to till a strip of soil and add the fertilizer at the bottom of the furrow by using a granular fertilizer tube. • Packer wheel with bars to provide a soil covers between the fertilizer and seed, and to break-up of large clods for improving seedbed. • Single disc opener with closing system to place the seed at proper depth, covers the seed, and packs the furrow. ii