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**Effect of different plant densities on growth and yield of sorghum(*Sorghum bicolor* L. Moench.)**

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**Abstract**

Sorghum is a crop with a various plant height depending on the planting density. If the height exceeds 1.8m, which is the harvestable height of the combine, loss is caused by clogging of the installation, entrance of the threshing section and the threshing section. The purpose of this study is to set the planting distance and number of plants per hill suitable for combine harvesting as the plant length does not exceed 1.8m. . The experimental variety was Nampungchal. The experiment design was a split-plot design with three replications. The treatments were as follow: Main-plot were 1 and 2 plants as number of plants per hill and sub-plots were 60 × 20 cm(practice), 70 × 15, 20, 25, 30 cm as planting distance. The amount of nitrogen, phosphate and potassium fertilization were 100, 70, 80 kg ha<sup>-1</sup>. Data were collected: (1) grain yield: weight of grain in kg ha<sup>-1</sup>, (2) 1000 grain weight: average weight of 1000 grain, (3) plant height: distance from soil to top of panicle, (4) ear length: distance from top of stem to top of ear in cm, (5) stem diameter: diameter of second internode, (6) tiller number per hill. Analyses of variance were performed using R version 3.3.1(<https://www.r-project.org>). The Duncan`s multiple range test(DMR) was used to separate treatment means at P < 0.05. As number of plants per hill increased, plant height and yield increased and tiller number decreased. As planting distance increased, plant height and yield decreased and tiller number increased. At 1 plant per hill, the plant height did not exceed 1.8m at all planting distance. At 2 plants per hill, the plant height did not exceed 1.8m from the planting distance of 70 × 25 cm. At 1 plant per hill, the tiller number increased to 0.23, 0.27, 0.60 and 0.70 as the planting distance increased to 70 × 15, 20, 25 and 30 cm, respectively. At 2 plants per hill, the tiller number increased to 0.03, 0.03, 0.14 and 0.40 as the planting distance increased to 70 × 15, 20, 25 and 30 cm, respectively. At 1 plant per hill, the yield decreased to 6030, 4280, 3400 and 3230 kg ha<sup>-1</sup> as the planting distance increased. At 2 plant per hill, the yield decreased to 7850, 5770, 5720 and 4960 kg ha<sup>-1</sup> as the planting distance increased. We recommend that the optimum number of plants per hill and planting distance is 2 and 70 × 25 cm suitable for combine harvesting.

Keywords: sorghum, planting distance, number of plants per hill, combine harvesting

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