AE 330 Laboratory 3, Seed Meter Testing

Finger meter accuracy test

Use the Kinze seed meter test stand to see how target population and speed affect seed placement accuracy.

a) Test the performance of the finger meter, at four speeds and three population levels. The experimental design includes 4 speeds of 6.4, 9.6, and 12.8 km/h (2, 4, 6, and 8 mph) and 3 different populations of 40,000 65,000 and 80,000 plants/ha (16200, 26325, 32400 plants/ac). For each run, print and record the statistics for the accuracy of the meter, the number of skips and doubles for 200 seeds. Repeat this three times to obtain data for 3 reps

In the laboratory report, provide a table of the following information for each target population and speed for each rep. And mean values for all three reps

i). Number of skips and doubles normalized to 100 seeds. That is the percentage of skips and doubles.

ii). The estimated accuracy of the meter based on the track data. The total error may be found by the following equation.

Total Error = 1*(# skips/) + 1*(# doubles/run) + 2*(# triples/run, if recorded)

Est. Accuracy = (Theoretical Total # of seeds - Total Error) / Theoretical Total # of seeds.

iii) Assume that the climatic conditions are such a corn field is capable of producing 15 Mg/hectare (250 bu/ac) at 32400 plants per acre, 12.5 Mg/hectare (200 bu/ac) at 26325 plants per acre and 10 Mg/hectare (160 bu/ac) at 16200 plants per acre, respectively. (i.e. For a plant population of 80,000 plants/ha (32400 plants/acre), the mean yield per plant is 187.5 g/plant etc). Assume that a skip results in zero yield for the missing plant and a 10% increase in yield for each adjacent plant. Assume that a double results on 45% yield for each of the two plants, and a triple results in 25% yield for each plant. Determine the average yield reduction per hectare for each of the test runs, at the different populations and speeds.

iv) Make plots of the following information versus speed

a) Total Error (percent basis) vs speed for each population combination (different curves on one graph).

b) Percent yield reduction vs speed for each population combination (different curves on one graph).

v) Calculate the seeding rate in seeds per minute for all speed and population tests. Make a single plot of the following information versus seeding rate in seeds per minute

a) Total Error (percent basis) vs seeding rate in seeds per minute (one curve for all data). Added a trend line that best fits the data. Show the trend line statistics on the graph.

b) Percent yield reduction vs seeding rate in seeds per minute (one curve for all data). Added a trend line that best fits the data. Show the trend line statistics on the graph.

vi) Make a recommendation on what the optimum ranges for the most accurate planting, and comment on the sensitivity and interactions of the metering system to target population, and ground speed.