

Plant sampling methods for seed drill research

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Seed rate variation across a seeding machine can be considerable. The coefficient of variation (c.v.) of cereal seed distribution from gravity seeder boxes is commonly 3-7% (1,2). Airseeders vary from 10%-20% or more depending on the seed size and sowing rate (3). To accurately measure emergence or other plant growth differences between different seed drill types or soil management practices, seeder metering and seed placement errors in sampling need to be removed.

Methods

In 1991 a seeder design comparison experiment of 32 wheat plots was sown. Two sampling Methods were used to determine the variation that could be expected in sampling for plant emergence with the use of the South Australian Department of Primary Industries new multi-row experimental seeder, used for testing different seeder design configurations. The first method was a transect plant emergence sample of a one metre seed row recorded for every seed drill row (8) of every plot directly across the experiment. The second method was eight random one metre triple row samples in each plot. In 1992 a third method which is a combination of both the first two Methods, was compared with method one in a sown seeder design comparison experiment of 44 wheat plots. A single one metre triple row sample was taken from each plot with all the rows corresponding to the same seeding row on the seed drill. Therefore the change in direction of the seeding machine was taken into account in sampling.

Results and discussion

Sampling results from the three Methods (Table I) indicate the high sample variation which can be obtained by a completely random plant sampling such as method 1. The practice of taking a transect sample to reduce the effects of plot variation, and recording plant emergence from the same three seeding machine rows such as method 3, will reduce the variation by up to 50% without affecting accuracy. The third method is also the least time consuming to collect.

Table 1. Plant emergence sampling method results (plants/m)

Sampling method	No rows counted	1991 Mean	Std. dev. (n-1)	c.v. (%)	1992 Mean	Std. dev. (n-1)	c.v. (%)
1. Transect	8 x 1m	20.6	4.7	23	24.7	5.3	21
2. Random	8 x 3x1m	19.6	9.7	49			
3. Transect	1 x 3x1m				24.4	2.8	11

Most currently manufactured broadacre seed drills are six row machines seeding on three rows or four or five row airseeders, rather than the older four row seeders sowing on two rows. All these. more recent machines commonly create the situation where soil throw of the machine causes one row to emerge through a hill, the next through a side of a hill and the third row through a furrow. This pattern is generally consistent for every three rows. It is recommended that a group of three rows are sampled rather than two at each sampling position to reduce sampling variation.

1. Anon. 1986. Evaluation Report 508. Prairie Agricultural Machinery Institute. Canada.

2. Anon. 1986. Evaluation Report 504. Prairie Agricultural Machinery Institute. Canada. Anon. 1983. Evaluation Report 296. Prairie Agricultural Machinery Institute. Canada.