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Corn establishment and yield response to after-market closing wheels in a rye cover crop system

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A rye cover crop (RCC) before corn can reduce erosion, herbicide use, and improve water quality. However, a RCC grown prior to corn can make planting difficult, leading to uneven emergence and lower yields. Farmers use aftermarket closing wheels to improve planting success, but their effectiveness in RCC systems is unclear. This study tested three closing wheels—standard rubber, cruiser extreme, and cupped razor—in Indiana field trials.

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1. What is the primary function of closing wheels in corn planting systems?

a. To close the seed furrow and ensure good seed-to-soil contact.
b. To meter and singulate seed from the hopper into the seed delivery system.
c. To control and maintain consistent planting depth across varying soil conditions.
d. To apply and incorporate starter fertilizer near the seed zone during planting.

2. Aftermarket closing wheels are most often used to address which planting concern?

a. Uneven seed spacing caused by inconsistent seed meter performance during planting.
b. Poor seed furrow closure in high-residue systems.
c. Inaccurate seeding rate due to improper planter calibration and setup.
d. Excess nitrogen loss from surface-applied fertilizer during early crop establishment.

3. In the context of neighboring corn plants within the same field and the same row, emergence delays of 10 days can reduce yields by

a. 6–9%.
b. 10–22%.
c. 35–47%.
d. 100%.

4. In the study, corn establishment was evaluated primarily by measuring

a. grain protein concentration.

b. root biomass at V6.

c. leaf chlorophyll content.

d. final plant population.

5. The study found that aftermarket closing wheels consistently increased corn yield across all site-years.

a. True.

b. False.

6. Where were the studies conducted?

a. Illinois.

b. Pennsylvania.

c. Ohio.

d. Indiana.

7. The presence of a rye cover crop reduced corn yield in 2 of 3 site-years when examined across closing wheel types. What reasoning do the authors present to justify this yield penalty?

a. Species incompatibility between rye and corn leading to poor crop performance under certain rotations.
b. Varying precipitation regime across site-years affecting soil moisture availability during early growth.
c. Higher aboveground biomass levels, total N uptake, and C:N ratio values.
d. Downturns in the corn market influencing management decisions and observed yield outcomes.

8. Selecting the proper closing wheel can improve plant stand, increase seed-to-soil contact, and alleviate side-wall or seed-zone compaction.

a. True.
b. False.

9. Why might improved early-season stand establishment NOT lead to higher yield?

a. Yield is determined only at planting.
b. Corn does not respond to plant population.
c. Later-season environmental factors can override early advantages.
d. Closing wheels affect only root growth.

10. Based on the article, what is the best recommendation regarding aftermarket closing wheels?

a. They should replace standard wheels in all conditions.

b. They may improve performance in high-residue conditions and reduce yield risk with rye cover crops.

c. They are only useful in irrigated systems.

d. They should only be used with high planting speeds.

11. Which of the following best describes “sidewall compaction” during planting?

a. Soil compaction caused by heavy rainfall after planting.

b. Compaction caused by excessive fertilizer application.

c. Soil crusting after emergence.

d. Smearing and compaction of the seed furrow walls by planter components.

12. What was the objective of this study?

a. To market a specific product.

b. To evaluate a corn–soybean rotation with different farm implements.

c. To measure rye grain yield.

d. To assess corn emergence and yield with different aftermarket closing wheels in a rye cover crop system.

13. Which of the following factors in NOT an option to prevent delayed corn emergence?

a. The use of a biological product.

b. Proper soil temperature.

c. Good seed-to-soil contact.

d. Sufficient soil moisture.

14. In evaluating planter performance, which of the following is an important early-season indicator of success?

a. Kernel weight.

b. Uniform emergence.

c. Grain moisture at harvest.

d. Test weight.

15. What are the benefits of a rye cover crop?

a. Reduce erosion, herbicide use, and improve water quality.

b. Provide a green bridge for important insect pests.

c. Generate a dual crop income.

d. Both b and c.

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