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Seed Tape Effects on Corn Emergence under Greenhouse Conditions

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BRIEF

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SEED TAPE has recently received attention as an alternative planting system for smallholder farmers in underdeveloped regions of South America, Africa, China, and India (Mateus, 2014). Seed companies are also developing seed-tape planting systems for germplasm evaluations (Deppermann et al., 2013). Although seed tape has been promoted as a method for ensuring uniform seed spacing and plant density of small-seeded flowers, herbs, and vegetables (Chancellor, 1969), little or no information is available on the use of seed tape for larger-seeded row crops and its effect on crop emergence. The objective of this study was to compare the emergence of corn seed embedded in tape to seeds planted by hand and to determine seed tape effects on rate of corn emergence.

Experiments were conducted in 2013 in greenhouses at Ohio State University and consisted of two treatments. Corn seed embedded in tape made of biodegradable cellulose, which is the material most widely used by seed tape manufacturers, was compared with seeds planted by hand. Two corn hybrids were used in the study—Pioneer brand 37Y14 treated with fludioxonil, mefenoxam, azoxystrobin, thiabendaz, and thiamethoxam and DeKalb DKC 65-63 treated with difenoconazole, fludioxonil, mefenoxam, and thiamethoxam.

Seed tape and seeds were hand planted 2 inches deep in flats with commercial top soil (Fig. 1). Greenhouse temperature was maintained at 70 to 75°F, and metal halide lamps provided approximately 220 μmol^{-1} m^{-2} s^{-1} supplemental photosynthetic photon flux for a 16-h daily photoperiod.

Corn emergence was recorded at the first appearance of coleoptile and monitored for approximately 2 weeks. Mean emergence time (MET) and emergence rate index (ERI) were used to measure how quickly and uniformly the corn emerged after planting. Multiple emergence counts were taken and used to calculate MET and ERI (Karayel and Ozmerzi, 2002). Treatments were arranged in a randomized complete block design replicated three times for each run. The experiment was repeated eight times (total of 24 replications), and a total of 240 seeds was used for each treatment (120

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Conversions: For unit conversions relevant to this article, see Table A.

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Table A. Useful conversions.

To convert Column 1 to Column 2, multiply by	Column 1 Suggested Unit	Column 2 SI Unit
2.54	inch	centimeter, cm (10^{-2} m)
9.29×10^{-2}	square foot, sq ft	square meter, sq m
5/9 (°F – 32)	Fahrenheit, °F	Celsius, °C

Figure 1. Corn seed embedded in seed tape and seeds planted by hand in the greenhouse.

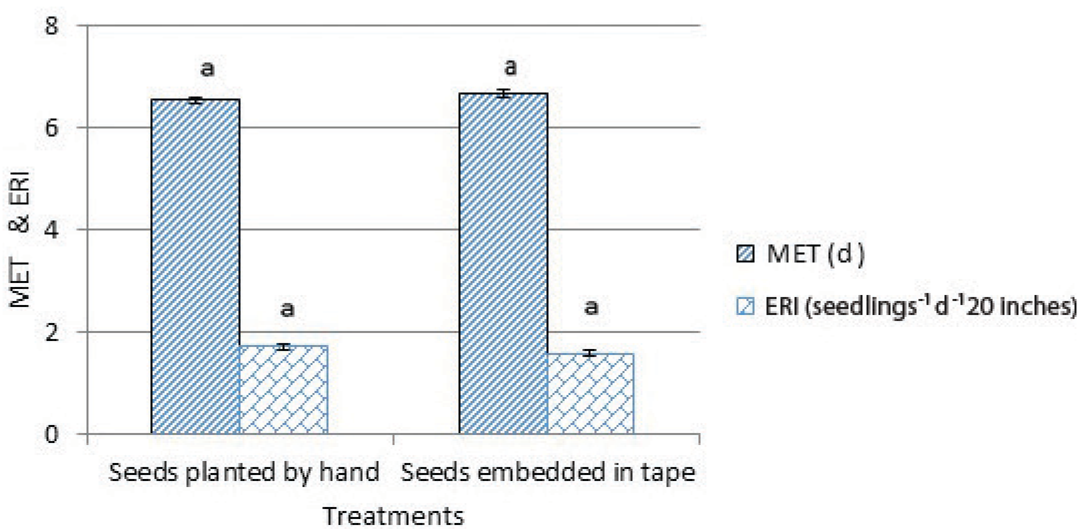

Figure 2. Mean emergence time (MET) and emergence rate index (ERI) of corn seed embedded in tape and seeds planted by hand under greenhouse conditions. Means with the same letter were not significantly different at the 0.05 probability level. (MET = $\frac{N_1T_1 + N_2T_2 \ldots N_nT_n}{N_1 + N_2 \ldots N_n}$; $N_{1 \ldots n}$: number of seedlings emerging since the time of previous count; $T_{1 \ldots n}$: number of days after sowing) (ERI = $\frac{S_{te}}{MET}$; S_{te} = number of emerged seedlings per 20 inches; MET, mean emergence time).

seeds for each hybrid). The data from the repeated experiments were combined for analysis because there was no significant interaction between treatments and experiments. Means were separated using Fisher's Protected LSD test at the $P \leq 0.05$ level.

SUMMARY

There was no significant difference in the emergence percentage (data are not shown), MET, and ERI of corn seeds planted by hand and embedded in tape (Fig. 2). Results from this study demonstrate that uniformity of corn emergence was not affected by seed tape under greenhouse conditions.

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