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# Influence of Dibble Shape and Depth on the Germination and Seedling Establishment of Burley Tobacco in the Float System

Robert C. Pearce

*University of Kentucky*, [rpearce@uky.edu](mailto:rpearce@uky.edu)

M. Cui

*University of Kentucky*

Lowell P. Bush

*University of Kentucky*, [lowell.bush@uky.edu](mailto:lowell.bush@uky.edu)

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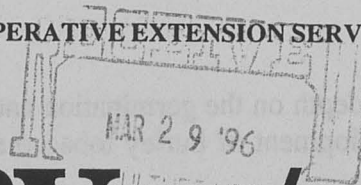
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# Agronomy *notes*

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## INFLUENCE OF DIBBLE SHAPE AND DEPTH ON THE GERMINATION AND SEEDLING ESTABLISHMENT OF BURLEY TOBACCO IN THE FLOAT SYSTEM

B. Pearce, M. Cui, and L. Bush

### Introduction

Direct seeding of pelleted tobacco seed into the float transplant system has become common in Kentucky. Direct seeding reduces labor compared to the plug and transfer method, but it increases the risk involved and requires more management by the producer. Uniform germination, and ultimately a high percentage of useable transplants are the keys to success with direct seeding.

Tobacco, like all plants, requires proper conditions for germination. The process of germination begins with the dry seed taking up water, thus the seed must have a moist environment. However, germination also requires oxygen, so a balance between adequate moisture and aeration must be achieved for high rates of germination.

Germination is only the first step in producing a usable transplant. The root is the first part of the seedling to emerge from the seed. Under normal conditions the root will enter growing medium and will soon be taking up water and nutrients for the

seedling. Occasionally the young root of a tobacco plant does not grow into the medium, but stays at the surface. This condition is commonly called "spiral root". Spiral root is thought to occur due to a lack of oxygen caused by excessively wet conditions in the growing medium. A spiral root plant rarely develops into a useable transplant. Trays with 10 to 20% spiral root plants have been reported.

In order to make a micro-environment that is more conducive to germination and growth, it is common to "dibble" the growing media prior to placement of the seed. Dribbling refers to the making of a small indentation in the surface of the media where the seed will be placed. Many producers are using dibble boards consisting of rounded or pyramid shaped objects fastened to a base with handles, that allows entire trays to be dilled at one time. Dibblers consisting of rounded or pyramid shapes on a rolling cylinder are also becoming popular among tobacco producers.

The objective of these studies was to determine the importance of dibble shape

and depth on the germination and spiral root development of burley tobacco seedlings.

### Materials and Methods

Two studies were conducted in the spring in a glass greenhouse at the University of Kentucky in Lexington. In study 1, polystyrene trays with 200 cells/tray were filled with fortified Speedling<sup>1</sup> tobacco media. The trays were carefully filled to avoid over packing of the media. Wooden pegs were carved into a pyramid or domed shape with a maximum width of 1/2 inch. Dibble marks were made by hand using either the pyramid or domed pegs at depths of 1/4, 1/2, or 3/4 inch. Each shape by depth treatment was replicated five times with one tray per replication. Pelleted seed (var. Ky14 x L8) was seeded over the trays using a vacuum seeder. All trays were floated in a common 14' x 6' water bed at a depth of five inches.

A second study was conducted using only the domed shaped dibble at depths of 0, 1/4, 1/2, 3/4, and 1 inch. The trays were filled with unfortified Carolina's Choice<sup>1</sup> media. Pelleted seed (var. NC BH129) was seeded with vacuum seeder and the trays were floated in a common water bed as in study 1.

Germination was considered to be emergence of the root and the first two leaves. Germination was counted at 17 days for study 1, and at 7 and 14 days after seeding for study 2. Germination is expressed as % seed germinated based on the total number of cells seeded. Evaluations of spiral root formation were made at the same time as the germination counts. The spiral root percentage is based on the number of germinated seed, not on the total cell number.

### Results

An interaction between dibble shape and depth was observed for Ky 14 x L8 germination at 17 days after seeding (figure 1). A shallow pyramid shaped dibble had much lower germination than any of the other treatments. The domed dibble created a dibble mark with rounded sides in which the pelleted seed was more likely to roll to the bottom of the dibble. At the shallow dibble depth, a seed near the bottom of the dibble mark was more likely to germinate. At deeper dibbling depths, the pyramid shaped dibble had slightly higher germination than the domed dibble. Regardless of shape, there was a trend for greater germination with deeper dibbling to 3/4". This is most likely due to a more favorable moisture environment in a deeper dibble.

Both dibble shape and depth influenced the occurrence of spiral root development, but there was no significant interaction between these factors (figure 2). The domed shaped dibble had a significantly lower incidence of spiral rooting. Reasons for this response are unclear, but it is thought that spiral rooting is caused by low oxygen in the media, and may be related to gas exchange. The rounded dibble marks may promote better air exchange around the seed than the pyramid shaped dibles. Alternatively it may be argued that because the seed was more likely to rest at the bottom of a rounded dibble, the contact between seed and media was more consistent than where a pyramid shaped dibble was used. Increasing dibble depth to 3/4" significantly reduced the incidence of spiral root.

The germination of NC BH129 decreased slightly with increasing dibble depth to 3/4 inch (figure 3). At a dibble depth of 1 inch, germination was much slower and the 14 day germination

percentage was well below the other treatments. The 1 inch dibble resulted in a disruption of the media structure in the cell, and resulted in reduced germination.

The effect of dibble depth on spiral root occurrence was similar to that observed in study 1 (figure 4). Spiral root incidence decreased with dibble depth, with a minimum amount of spiral root at a depth of 3/4 inch. Even though germination was relatively high in the undibbled treatment, the incidence of spiral root was also quite high. Dibbling at 1/2 to 3/4 inch depth apparently provides a favorable balance between moisture and aeration for proper germination and growth of burley tobacco seedlings.

Based on the results of these studies the best results were obtained using a rounded shape dibble at a depth of 1/2 to 3/4 inch. This treatment gave good germination with the least spiral root incidence.

*Bob Peone*

Extension Tobacco Specialist

<sup>1</sup> Where trade names are used, no endorsement is intended, nor criticism implied of similar products not named.

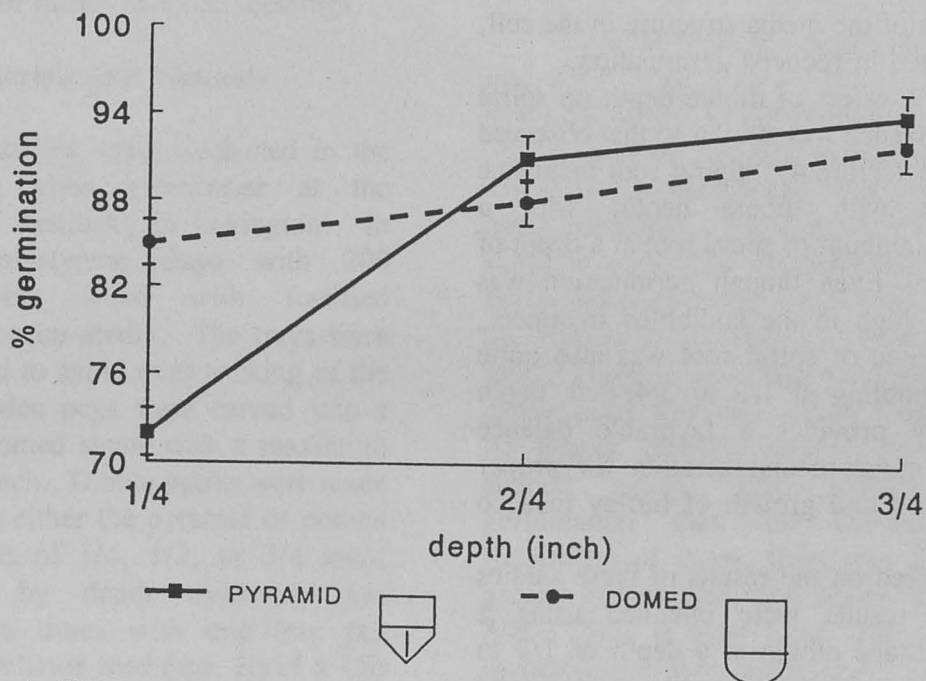


Figure 1. Dibble shape and depth effect on percent seed germination of burley tobacco Ky14 x L8 at 17 days after seeding in a greenhouse float system. Each point is the average of five replications. Error bars represent the standard error of the mean.

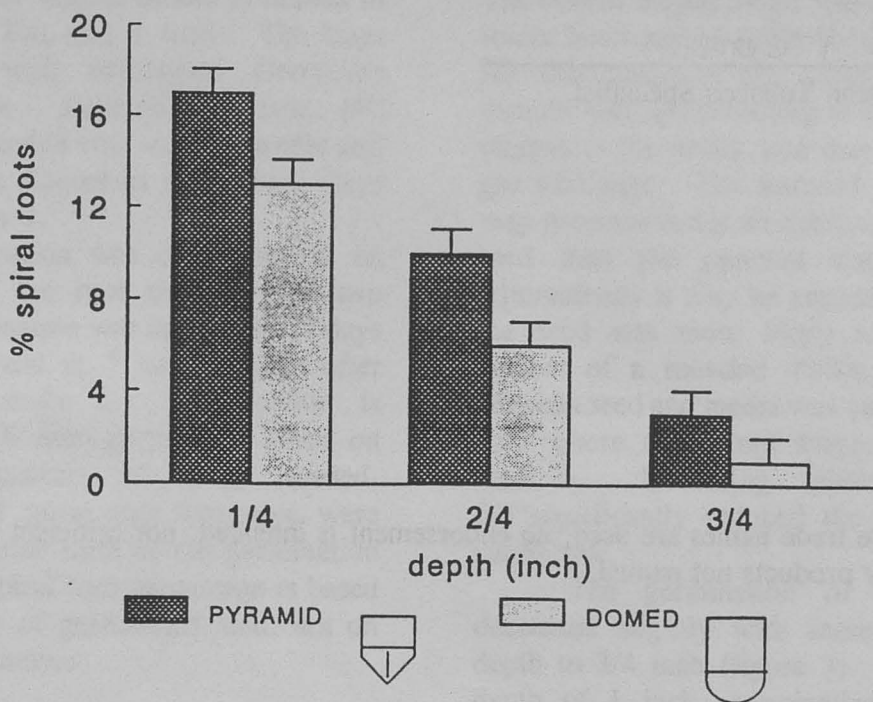


Figure 2. Dibble shape and depth effect on percent spiral root development of burley tobacco Ky14 x L8 at 17 days after seeding in a greenhouse float system. Each point is the average of five replications. Error bars represent the standard error of the mean. No shape by depth interactions were observed.

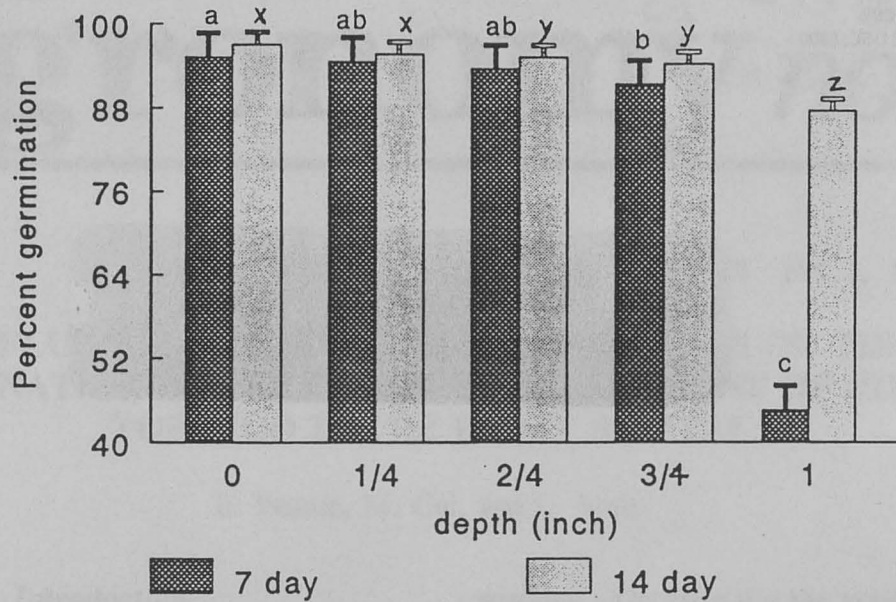


Figure 3. Effect of dibble depth on percent seed germination of burley tobacco NC BH129 in a greenhouse float system. Each bar is the average of five replications. Bars with different letters for the same sampling date are significantly different.

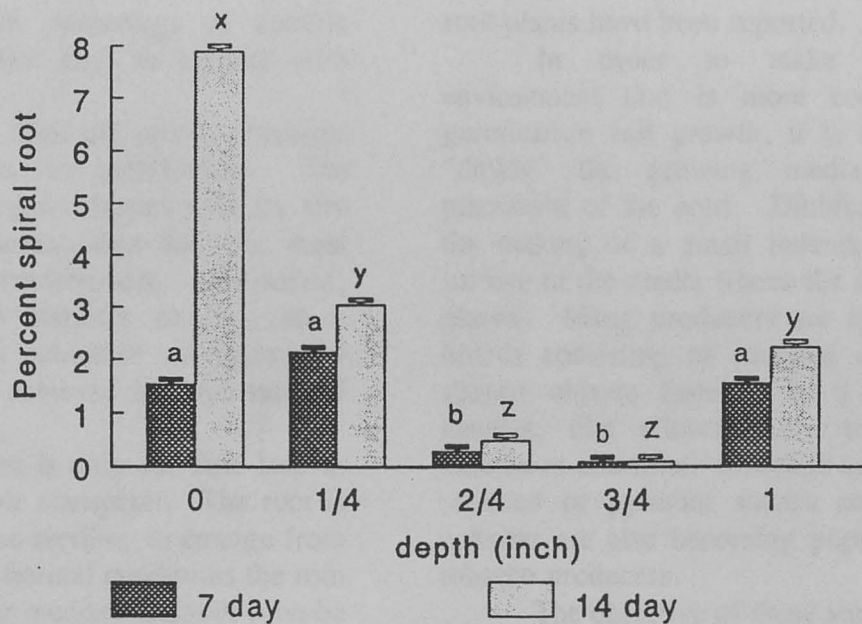


Figure 4. Effect of dibble depth on percent spiral root development of burley tobacco NC BH129 in a greenhouse float system. Each bar is the average of five replications. Bars with different letters for the same sampling date are significantly different.

