EFFECT OF SEED TUBER AND SEED PIECE SIZE ON GROWTH AND INCIDENCE OF HOLLOW HEART IN NORGOLD RUSSET POTATOES

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Abstract

Small seed pieces decreased yield and number of tubers. Both seed tuber and seed piece size affected the percentage of tubers with hollow heart. Hollow heart increased from 14 to 22% as the seed tuber size increased from 57 to 228 g and decreased from 27 to 19% as the seed piece size increased from 28 to 57 g. The least hollow heart (11%) occurred in tubers of plants grown from 57 g whole seed pieces and the most (26%) in tubers of plants grown from 228 g seed tubers cut into 28 g seed pieces. Hollow heart was positively correlated with the mean tuber size and negatively correlated with the number of mainstems per hill, total yield, and total number of tubers.

Resumen

Semilla cortada de pequeño tamaño disminuyó el rendimiento y número de tubérculos. Ambos tipos de tamaño de semilla, tubérculo entero y tubérculo fraccionado, tuvieron su efecto en el porcentaje de tubérculos con corazón vacío. Este defecto de tubérculo aumentó de 14 a 22% a medida que el tamaño de semilla entera se incrementó de 57 a 228 grs. y disminuyó de 27 a 19% a medida que la semilla cortada se incrementó de 28 a 57 grs. El menor porcentaje de corazón vacío (11%) ocurrió en tubérculos de plantas provenientes de semillas enteras de 57 grs. y el mayor porcentaje (26%) en tubérculos de plantas provenientes de tubérculos de 228 grs. que fueron cortados en fracciones de 28 grs. El corazón vacío expresó correlación positiva con el tamaño promedio de tubérculos y correlación negativa con el número de tallos principales por planta, rendimiento total y número total de tubérculos.

Introduction

Though hollow heart in Norgold Russet is found in tubers growing under weather conditions favoring rapid tuber enlargement (4), the adverse effect of these conditions can be reduced by good cultural practices. Spac-
ing, application of potassium, and time of planting are among the cultural variables that can modify the incidence of hollow heart (3). Seed tuber and seed piece size are two other variables over which the potato grower has some control. Since these affect various aspects of plant growth (1, 2, 5) such as number of mainstems and tubers, average tuber size, and yield, they could also affect hollow heart. This study was conducted to determine what effect seed tuber and seed piece size have on the incidence of hollow heart and the relationship of hollow heart to yield and tuber number.

Materials and Methods

Potatoes in this study were grown at the Potato Research Farm near Grand Forks, North Dakota on a Bearden silt loam soil. In all years seed pieces were spaced 61 cm in rows 97 cm apart and 12 m long. The wide spacing was used to increase the incidence of hollow heart. Seed tubers were hand selected and sorted into 57, 114, 170 and 228 g size classes in all years except 1974 when only the latter three size classes were selected. Tubers in each class did not vary more than 11 g from the class mean. Seed tubers were hand cut into either 28 ± 5 or 57 ± 10 g seed pieces and then suberized at 10 C before planting. Planting dates were: June 7, 1974, June 5, 1975, June 1, 1976 and May 30, 1978. Treatments were replicated eight times in 1974, 1976 and 1978 and three times in 1975. Treatments were arranged in a split plot design; the various seed tuber sizes were assigned to the large plots and the two seed pieces sizes to the subplots. Plant stands were recorded in all years and mainstems were counted in 1974, 1975 and 1976. Plots were harvested on September 25, 1974; September 17, 1975; and September 27, 1976 and 1978 without any prior rotobeating or vine killing.

Following harvest, tubers were hand sized and cut to inspect for hollow heart. Only in 1978 was there any significant yield of misshapen tubers (5.9%). In other years there were less than 2% and in all instances these tubers were included as part of the reported yield.

Results and Discussion

During the four years, rainfall from planting to harvest totaled 21 cm in 1974, 18 cm in 1975, 24 cm in 1976 and 34 cm in 1978. The growing season (from planting to harvest) was 105 days in 1974, 104 days in 1975, 118 days in 1976 and 120 days in 1978. Analysis of variance showed no significant interaction between the seed tuber and seed piece size on tuber number, tuber yield, or percent hollow heart. Data were averaged over years in two ways. Two years, 1975 and 1978, had eight treatments and a high incidence of hollow heart in common. The other set of averages is based on the three years with a high average incidence of hollow heart but only six treatments in common. The averages do not include 1976 because of the low incidence of hollow heart.