



The biological effect of the electrical field treatment on the potato seed: agronomic evaluation

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Abstract

The intense electrostatic fields, particularly the pulse shaped ones, can affect the biological systems, either directly or indirectly, through several mechanisms. The field induces the translation and rotation movements of the electric charges and dipoles subjected to complex limit conditions. The chemical reaction rates, the molecular binding forces, the protein molecule shape and structure can also be modified. This paper deals with and discusses: the electrical field treatment method for the seed potato and the physiological, biochemical and biological results obtained in the field. In order to study the effects of the seed material treatment on the potato culture, field experiments were carried out by planting the treated tubers from four species (ROCLAS, ROMANO, SANTE and DESIREE) in different variants. The experiments were made according to the experimental norms, in three repetitions, with the repetition plot size of 28.125 m². Observations were made dynamically by gathering the potato plants at five different ages within the vegetation period, on which occasion individual measurements were carried out for the determination of the growth and development rate of the potato plants, on the different treated variants, on each species and at

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each repetition. The measurements referred to the number and length of the main stems, as well as to the formation and growth of the tubers in the potato holes.

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1. Introduction

The investigation of different types of seeds has been previously reported by other research groups [1,2]. In order to study the effects of the seed material treatment on the potato culture in 2003 field experiments were carried out by planting the treated tubers, from four species (ROCLAS, ROMANO, SANTE and DESIREE) in the variants shown in Table 1.

The electrostatic field exposure with a value of 400 kV/m (see Fig. 1) was carried out for 12 min for each sample of seed potatoes, with the polarity + (positive) on the tubers and - (negative) on the metal grate, with a pause period of 1 day between the treatment moment and that of the material planting in the field (variant V_2). In the case of the V_3 variant, the reversed polarity (negative on the tubers and positive on the metal grate) was applied with a pause period of 7 days. The V_4 variant was identical with V_2 (positive on the tubers) but with a 7-day pause period. After the treatment had been carried out the seed potatoes were stored in small boxes, in the storehouse, in normal conditions, until the time of their planting in the field. The planting was performed in tilled and normally fertilized soil, on lots according to the experimental norms, in three repetitions, with the repetition lot size of 28.125 m². Normal tillings were carried out for the culture maintenance and the phyto-sanitary treatments were performed according to the technology specific for the potato seed. Within the vegetation period, one observed the effect of the treatments applied to the springing plant, the growth and development rate, as well as the formation and the accumulation rate on the tubers, together with the obtained yield. Observations were made during evolution by gathering the potato plants at five different periods within the vegetation time. The measurements refer to the number and length of the main stalks, as well as to the formation and growth of the tubers in the potato nests. Yield determinations were made on the final cropping in variants and repetitions on the standard size fractions (consumption over 60 mm), seed 35–55 mm and small

Table 1
Experimental data

Variant	Pause period (days)	Current dose	Polarity (on the tubers)	Duration minutes
V_1 (control)	Untreated	X	X	X
V_2 (D3)	1	400 kV/m	+	12
V_3 (D2)	7	400 kV/m	-	12
V_4 (D1)	7	400 kV/m	+	12

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