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Yield and seed quality of buck's horn plantain (*Plantago coronopus* L.)

INTRODUCTION

Buck's horn plantain (*Plantago coronopus* L., family *Plantaginaceae*), commonly called Erba Stella and Barba di Frate – the monk's beard is one-or too-year old wild growing plant, common in the Mediterranean region, in the western and north-western Europe, and on individual positions in other parts of Europe, North Africa and Asia Minor.

This is the species with a high potential in herbal medicine due to inhibitory and cytotoxic effects on cells of certain cancers herbal extracts (Gálvez et al. 2003). In Poland, buck's horn plantain is subjected to total protection of species. The natural sites of this species was found only along the coast of the Baltic Sea. Main reasons of the decline of natural occurrence of *Plantago coronopus* in Poland are: melioration meadows, lack of grazing, the destruction of the meadows. In the Polish Red Book Plants *Plantago coronopus* is considered to be critically endangered taxon (Piotrowska 1988, Sadowska and Żółkoś 2011). One of the most effective form of protection is the development of cultivation methods of endangered species, but in this case, the high quality propagating material is required. It would give the opportunity to effectively reproduce the plants in a natural environment, as well as the supply of natural population of individuals derived from crops. The aim of the research was to evaluate the yield and seed quality of buck's horn plantain (*Plantago coronopus* L.).

Photo 1. Buck's horn plantain (*Plantago coronopus* L.)

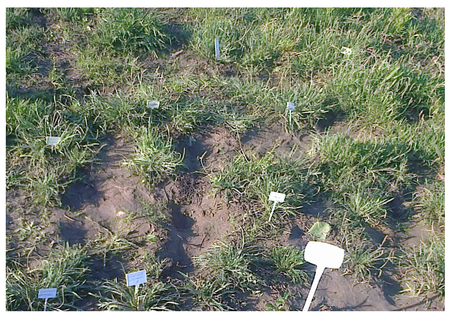

Photo 2. Buck's horn plantain at the experimental field (two-year-old plants, Septemper, 2012)

MATERIALS AND METHODS

The cultivation trials of buck's horn plantain were carried out in the years 2010-2012. at the experimental field of the Department of Vegetable and Medicinal Plants of Warsaw University of Life Sciences – SGGW. Plantago coronopus seeds originated from the Botanical Garden in Brno. The seedlings were produced in a greenhouse. In mid-May, 50 three-month-old seedlings were planted out to the field at 40×40 cm distance.

Individual, two-year-old plants (20 plants) were evaluated in the years 2011-2012. by counting the number of leaves and inflorescence, and weight of seeds per plant. The 1000-grain weight and seed germination were estimated, too. The seeds used in the experiment were collected at the complete maturity, from two-year-old plants. The 1000-grain weight and germinability were assessed directly after harvest and after one-year storage of seeds (at 10°C), according to The International Seed Testing Association (ISTA 2011). The all results were expressed as a mean from two years.

The test of germinability was done on filter paper in Petri dish, in the air-conditioning chamber, at 25°C, and light intensity 150 µE·m-2·s-1 (24 hours). First calculation was done after 10 days and second one after 21 days. Test results were expressed as a percentage of normal seedlings (ISTA 2011).

The results of the 1000-grain weight and germinability were shown as mean values from two years. They were subjected to analysis of variance (ANOVA). P-values <0.05 were considered as significant. Differences between the means were evaluated using the Tukey test.

RESULTS

The obtained results indicate that it is possible to cultivate buck's horn plantain in Poland and get relatively high quality of the seeds. The individual plants differed in respect of investigated traits. The number of leaves per one plant fluctuated from 27 to 39 (Fig. 1) and the number of inflorescence – from 7 to 19 (Fig. 2). The obtained seeds mass fluctuated from 0.0647 to 0.3258 g per plant (Fig. 3).

The one-year storage of seeds significantly affected their 1000-grain weight and germinability. Directly after harvest the seeds were characterised by the highest the 1000-grain weight and germinability than the seeds after one-year storage (Fig. 4. Fig. 5).

The results of this study indicate that it is possible to obtain relatively high yield of seeds and well germinating seeds which retain their germinability after year of storage.

Characteristic of plants

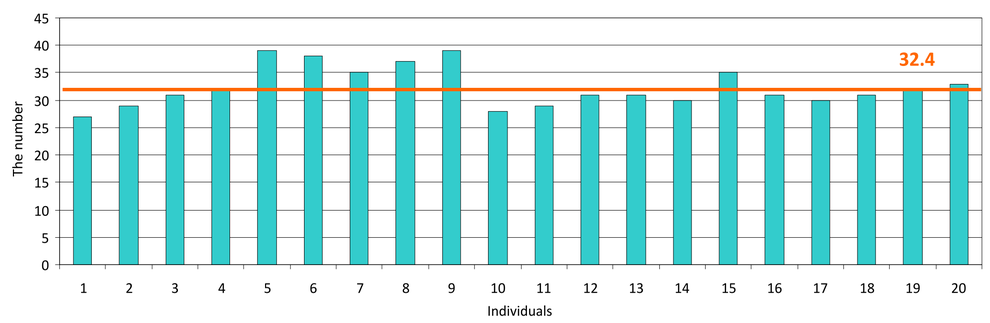

Figure 1. The number of leaves per plant (mean from two years)

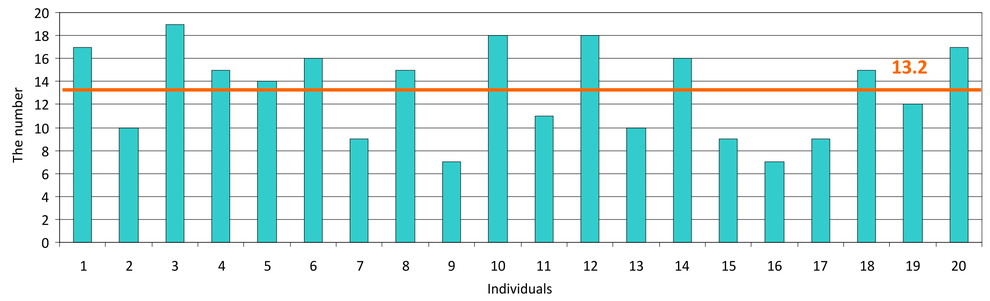

Figure 2. The number of inflorescences per plant (mean from two years)

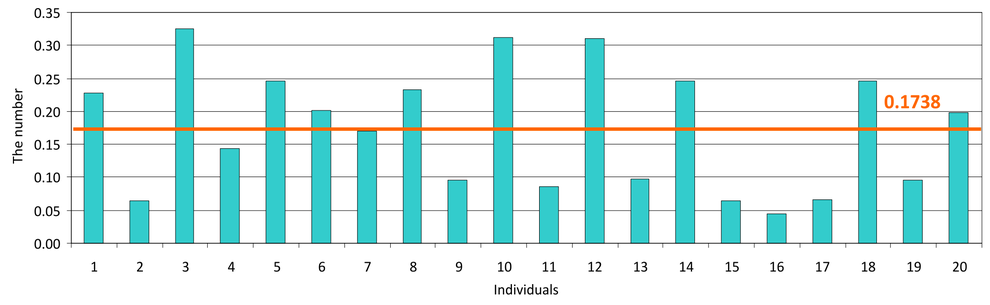

Figure 3. The weight of seeds per plant [g] (mean from two years)

Seed quality

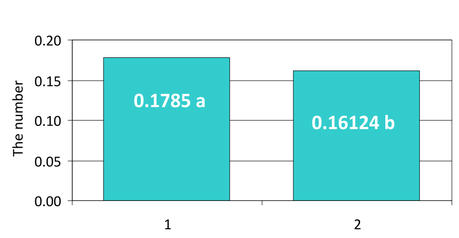

Figure 4. The 1000-grain weight [g] (mean from 20 plants and two years)
* Values marked with the same letter do not differ significantly at α=0.05

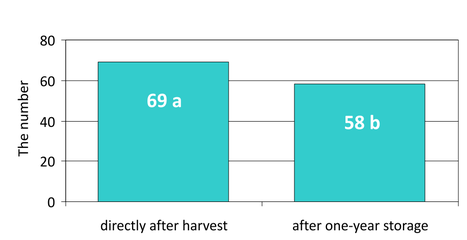

Figure 5. The germinability of seeds [%] (mean from 20 plants and two years)
* Values marked with the same letter do not differ significantly at α=0.05

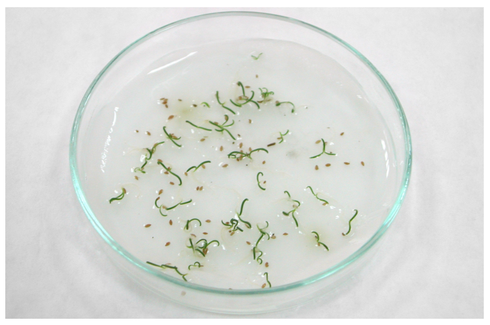

Photo 3. The test of germinability seeds (10 days of test)

Photo 4. The development of seedlings

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