

Growing Grain Amaranth

Elisaveta Vasileva

University of Agribusiness and Rural Development - Bulgaria

Abstract

Agricultural field experiment with plants of Grain Amaranth / *Amaranthus cruentus* L. BRS Alegria / is being carried out on resinous humus soil in transcontinental climate conditions in the region of Plovdiv. During the two growing years were obtained satisfactory yields from the areas, in the range of 100-150 kg/da. The conclusion is that it is potentially possible cultivation of the crop in this region.

Key words: *Amaranth, field experiment, cultivation.*

Introduction

Interest to the family Amaranthaceae is provoked by the numerous benefits of some of the species of amaranth to the human body. UN organization FAO announced amaranth culture of the XXI century, and according to some authors, this ancient plant can occupy a dominant position not only in the quality of food and feed, but also drug culture (Попов Д., 2014; Чиркова Т., 1999).

Amaranth seeds are very high nutritional value. In the scoring system of the WHO quality protein Amaranth obtain an average of 77 points with an average protein content of 15%, while wheat at an average of 14% protein has 47 points. The seeds contain vitamin C, B1, B2, B3, B5, B6, B9 and are characterized by a high content of iron and other various minerals - potassium, calcium, magnesium, copper, zinc, manganese, selenium, phosphorus, and the like. The whole plant is the source of the oil, starch, pectin, carotene, sugars, fiber (Попов Д., 2014; Beatriz Valcárcel-Yamani, Suzana Caetano da Silva Lannes, 2012; Delia R Tapia *et al.*, 2010). The oil of amaranth (6-8% by weight of the seed) is rich in linoleic acid of the omega-end 6, phytosterols, Vitamin E, and has a unique source of antioxidants squalene (8%).

The spectrum of the curative effect of the compositions of the various components of amaranth include infections, diabetes, circulatory diseases, digestive, urinary and genital system, radiation sickness, tumor treatment, purification from heavy metals, radionuclides, and others (perunica.ru, 2011).

At present the cultivation of amaranth in the world is relatively small. Relatively most common in Central and South America, and India. In Europe, the greatest interest in exploration and production of amaranth is shown in Austria, Czech Republic, Slovakia, Germany, Hungary, Poland, Russia, Italy and Slovenia (Beatriz Valcárcel-Yamani, Suzana Caetano da Silva Lannes, 2012; Bruna Menegassia, 2011). In Russia and Ukraine has built a rich research work on the use of amaranth as a forage plant, as it is extremely drought resistant (transpiration ratio 250, while corn is 330) and high biological productivity (green mass yields exceed 20-30% yields corn) (amarant-ukr.com.ua, 2009; perunica.ru, 2011).

Purpose of the experiment is to determine whether the soil and climatic conditions in the region of Plovdiv are suitable for growing grain amaranth.

Material and methods

Agricultural field experiment with plants of Grain Amaranth /*Amaranthus cruentus* L. BRS Alegria/ is being carried out on resinous humus soil in transcontinental climate conditions in the region of Plovdiv. Elements of the experiment are rectangular with a carrying area based on 30 plants (2m²), located in north-south across the area's dominant strong westerly winds in triplicate.

The assay was performed in the following agrotechnics: Crop rotation with eggplant (*Solanum melongena*). Tillage involves deep autumn plowing and spring plowing, cultivation and milling. Organic fertilization is against predecessor with 5t/da manure. Sowing for the production of seedlings was carried out at the end of April and planting - in the second decade of May (19-20.05). Care in vegetation include weeding, earthing up and watering with watering rates 20-30m³. Harvesting is manually in the middle of the August.

Agro-meteorological conditions are specified in Table 1.

Table 1. Agro-meteorological conditions

2013	Tav., °C	δT , °C*	ΣR , mm	%**
May	16,8	-0,3	3,3	5
June	18	-2,9	109,9	204
July	19,9	-3	63,3	127
2014	Tav., °C	δT , °C*	ΣR , mm	%**
May	13,8	-3,3	180	277
June	17,7	-3,2	149	276
July	23,5	0,6	70	140

* Deviation of the mean monthly temperature of the norm for the region of Plovdiv (1961-1990)

** Balance of the monthly rainfall against the norm for the region of Plovdiv (1961-1990)

Results and discussion

During the two growing years were obtained satisfactory yields from the areas, in the range of 100-150 kg/da (Figure 1). Differences between years are due to the intrinsic difference in the weather at the beginning of the vegetation of plants - May 2014 was too cold and wet. As other authors indicate amaranth yields are highly variable and depend on many factors (Kauffman, CS, and LE Weber. 1990; Myers, RL 1996).

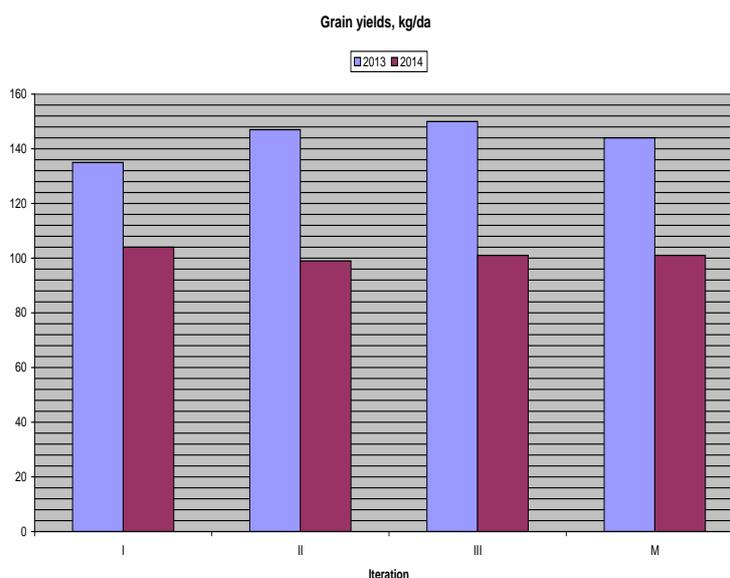


Fig.1.



Pic.1. Seedlings



Pic.2. Maturity

According to various researchers yield of grain amaranth vary widely. In a production environment are reported from 80 to 150kg/da (Hernádo Bermejo and J. León, 1994) and even 10-150kg/da grain (Kauffman, CS, and LE Weber., 1990). Hand harvested yields have reached 400kg/da in Montana (Cramer C., 1988). Maximum yields were obtained in Peru - 600kg/da grain (Sumar K. and others. 1986). In small test studies in the United States are obtained yields of 100 to 300kg/da (Myers RL, 1996). Study at the University of Minnesota conducted for 12

years, confirms that realistic yields 60-150kg/da (Putnam DH *et al.*, 2014). These data fully overlap with those obtained in the present experiment results.

Conclusion

When growing grain amaranth in the Plovdiv region were obtained satisfactory yields of grain from the experimental plots, the order of 100-150 kg/da, therefore in the region is potentially possible cultivation of the crop.

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e-mail: esvirgr@abv.bg