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PRODUCTIVITY OF NEW LINSEED GENOTYPES NS PRIMUS AND NS MARKO AND POSIBILITY USE IN MEDICINE

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Abstract

Linseed - *Linum usitatissimum* L. is an important raw material for functional food and medicinal purposes due to its high content of α-linolenic acid (ALA, omega-3 fatty acid), lignans and fiber, in its seed and oil. Linseed or linseed oil as a functional food ingredient, incorporated into baked foods, juices, milk and dairy products, muffins, cakes, pastries, dry pasta products and meat products for the purpose of sensory enhancer of taste and product quality. Linseed have various properties: antioxidant, immunomodulatory, antimicrobial, antiprotozoal, anti-inflammatory, insecticidal, analgesic, anti-hyperlipidemia, anti-hyperglycemic, antitumors and have effects on disease prevention: GI disorders, cardiovascular, urogenital and respiratory diseases. Linseed have application in drug formulations. Because of the great importance of linseed, in this study, the productivity parameters of new genotypes of oil linseed: NS Primus and NS Marko are presented. Morphological productive parameters and quality parameters of the tested linseed varieties were tested: plant height, plant weight, number of seed per plants and grain yield. The experiments were carried out on the plots of the Institute of Field and Vegetable Crops in three repetitions and their aim was testing of stability and productivity of these genotype. Genotype had a significant influence on the examined morpho-productive parameters. By applying the new, improved varietal production technology, we can successfully face the climate changes that are more and more present from year to year, and which certainly determine the direction of future development. The new genotypes of linseed have achieved excellent performance and are recommended for wider production both in our country and in neighboring countries primarily due to the great technological importance of linseed products.

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Key words: *Linseed, New genotypes, NS Marko, NS Primus, Importance for health;*

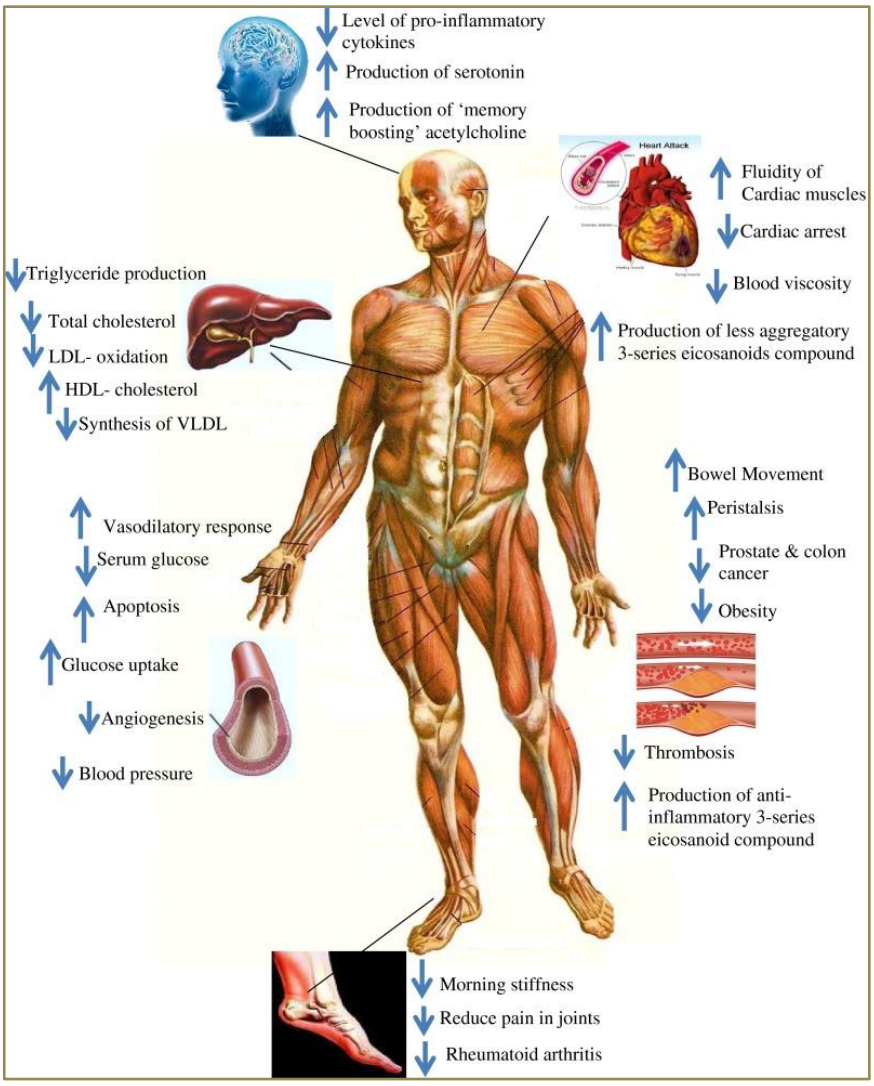
Introduction

Linum usitatissimum L. - flax or linseed is an oil and textile plant, originating from the eastern Mediterranean. The most important varieties of linseed are: linseed for fiber (var. elongata), oil linseed (var. brevimulticaulia) and transitional variety for combined use (var. intermedia). Linseed oil is widely used in nutrition, chemical and pharmaceutical industry, animal feed industry, etc. In Serbia, the most common high-yielding linseed oil varieties are: "NS Primus" and "NS Marko". They are characterized by high grain yield (1.5 t ha^{-1}), high oil content in seeds (40-45%) and high oil yield [1, 2, 3]. Linseed is very important oilseed crops for industrial production of food, feed, and fiber purposes. No matter how good a food is for the general public to consume, if that food does not have acceptable taste, texture, appearance, colour and aroma qualities, then the majority of people will not eat it. Linseed has several characteristics that could negatively affect its flavour profile and that are cause for concern. The two most important are: the potential for the very high omega-3 fatty acid content in linseed to become rancid through oxidation, and the propensity for bitterness, highly susceptible to oxidation. Seed has high content of alpha linolenic acid (ALA) which is highly susceptible to oxidation. The oxidation and then rancidity will lead to unpleasant flavours and a musty aroma which would not pass the taste tests. The content of secoisolariciresinol diglucoside (SDG), an antioxidant in linseed, is of great value in curtailing any oxidation process. In addition, linseed has been described as possessing a “nice nutty smell and aroma” [4], and is potentially ideal for adding the incorporation into a variety of foods. In research studies, linseed has been incorporated successfully into snack bars, muffins, bagels, bread, buns, tea biscuits, cinnamon rolls and pasta [5,6,7].

The linseed stem is high strength and durability and seed have oil rich in omega-3- α-linolenic acid (ALA), digestible proteins, phenolic compounds, lignans and fiber. Lignans is anti-carcinogenic compounds. The omega-3s and lignan phytoestrogens of linseed are in focus for their benefits for a wide range of health conditions and may possess chemo-protective properties in animals and humans [8-13]. The linseeds contain 35-45% oil, which contains 9-10% of saturated fatty acids (palmitic and stearic), about 20% monounsaturated fatty acids (mainly oleic acid), and more than 70% alpha-linolenic fatty acids acid. The protein content in seeds of linseed varies from 20-30%. Proteins of linseeds are limited by lysine, but are characterized by a high coefficient of digestibility (89,6%) and biological value (77,4%). The content of dietary fiber reaches 28% by weight of whole seed, with the ratio of soluble and insoluble fractions from 20:80 until 40:60. It content B-group vitamins and some minerals linseeds are close to the crops. Vitamin E in the linseeds is mainly in the form of gamma-tocopherol (9,2 mg/100 g of seeds). Linseed is the richest in the vegetable world source of lignans (up to 0,7-1,5% of dry weight of seed), among which prevails secoisolariciresinol diglucoside. Consumption of 50 g/day of linseed showed no

adverse effects in humans [14]. To ensure high bioavailability of its bioactive components, linseed should be consumed in the ground form.

Due to its numerous nutritional properties, linseed has been classified as a "superfood", that is, a food of natural origin with various bioactive components and many health-promoting benefits. Linseed consumption can be an important factor in the prevention of diseases, particularly of those related to nutrition. The regular consumption of linseed may help to improve lipid profile and lower blood pressure, fasting glucose, and insulin resistance index (HOMA-IR) [15], Picture 1.



Picture 1. Physiological effects imparted by functional elements of flaxseed (oil, fiber and lignans) (Source: https://pubmed.ncbi.nlm.nih.gov/25190822/#&gid=article-figures&pid=fig-3-uid-2)

Linseed is emerging as an important functional food ingredient because of its rich contents of α-linolenic acid (ALA, omega-3 fatty acid), lignans, and fiber. Linseed and its components may improve cardiovascular health because of their numerous attributes. 35% of linseed mass in oil, of which 55% is alpha-linolenic acid (ALA). Flax meal, which is devoid of oil, contains the lignan secoisolariciresinol diglucoside (SDG). Linseed, linseed with very low ALA, linseed oil, linseed lignan complex (FLC),

and SDG reduce the development of hypercholesterolemic atherosclerosis by 46%, 69%, 0%, 73%, and 34%, respectively, in experiment on the rabbit. FLC and SDG slow the progression of atherosclerosis but have no effect in regression of atherosclerosis. Suppression of atherosclerosis by linseed is the result of its lignan content and not the result of ALA content. Suppression of atherosclerosis is associated with lowering of serum lipids and antioxidant activity [26]. Linseed oil, fibers and linseed lignans have potential health benefits such as in reduction of cardiovascular disease, atherosclerosis, diabetes, cancer, arthritis, osteoporosis, autoimmune and neurological disorders. Linseed protein helps in the prevention and treatment of heart disease and in supporting the immune system [16], Picture 1.

Human studies have shown that linseed can modestly reduce serum total and low-density lipoprotein cholesterol concentrations, reduce postprandial glucose absorption, decrease some markers of inflammation, and raise serum levels of the omega-3 fatty acids, ALA and eicosapentaenoic acid [17]. Consumption of linseed in different forms has valuable effects and protects against cardiovascular disease, hypertension, diabetes, dyslipidemia, inflammation, insulin resistance, body mass increasing and some other complications [18]. This study points to the nutritional composition of linseed, the productivity of linseed and its health benefits.

Material and Methods

Experiments with linseed were carried out in 2022 on the plots of the Institute of Field and Vegetable Crop, in Bački Petrovac (φN 45° 20', λE 19° 40', 82 m above sea level) on chernozem, on according to a random block system in three replicates on the plots of 10 m^2. In this study, the yields components of linseed varieties NS Primus and NS Marko, Picture 1a, were examined in two variants: without the application of foliar nutrition (V1-control) and in the variant with foliar nutrition (V2). The optimal production technology was applied for the tested varieties. Linseed was sown at the end of April, at a sowing depth of 3 cm and an inter-row distance of 25 cm, with a seed quantity of 50 kg ha^{-1}. Since linseed has pronounced seed dormancy, it is suggested to use 2-4 year old seeds for sowing. Foliar fertilization was applied with Phyto-complex, two times during the intensive growth of the plants (2 l ha^{-1}). The harvest of linseed varieties was carried out at the technological maturity of the crop, when the grain yield of all varieties was analyzed and calculated in t ha^{-1}.

Table 1. Description of the two environments used to evaluate 2 linseed varieties.

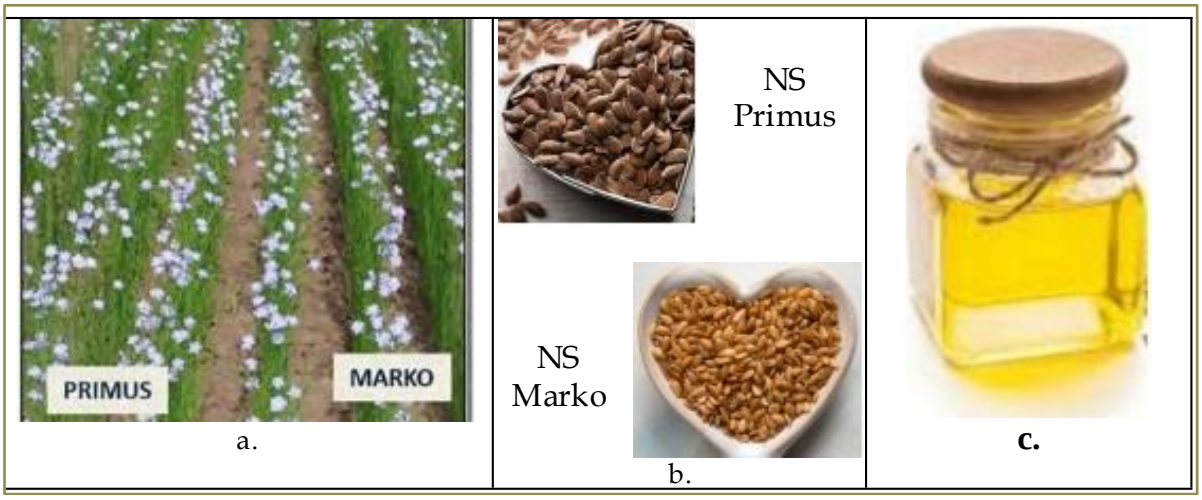
Environment	Growing season	Foliar treatments (foliar variant) within environments, l ha^{-1}
E1	2022	0 – V1, control- without foliar nutrition
E2	2022	2 - V2, variant with foliar nutrition

During the harvest at the stage of full maturity, each harvesting linseed varieties plot were measured separately. At the stage of full maturity, ten average linseed plants from each replication of each plot separately were selected and were estimated the

yield traits, such as a PH -plant height (cm), PM- plant mass (g) and GY- grain yield (t ha^{-1}) were estimated. Plant height was measured after harvest and linseed grain yield were adjusted to the 14 % moisture content and expressed in t ha^{-1}. Descriptive statistics were performed for the average value of grain yield and the IV- interval of variation.

Statistical analysis

The analysis of the obtained experimental data was carried out through descriptive and analytical statistics with the help of the statistical package STATISTICA 12 for Windows. Defined analysis of variance model with two variability factors, all significance assessments were performed on the basis of the LSD-test for a significance level of 0.5% and 0.1%. Relative dependence was defined using the method of correlation analysis, and the obtained coefficients were tested with a t-test for a significance level of 0.5% and 0.1%. The results are presented tabularly and graphically.



Picture 2. NS Primus and NS Marko linseed variety crops, a., seed, b., linseed oil, c.

Soil factors

The soil on which the linseed was produced was fertile chernozem. The pH value of the soil was determined potentiometrically in a suspension with 1 M KCl and distilled water, the $CaCO_3$ content was determined by the volumetric method, organic carbon (humus) sulfochromic was determined by oxidation, total nitrogen was determined by the Kjeldahl method, while available phosphorus and potassium in the soil were determined by extraction in ammonium lactate (AL) solution [2]. The basic chemical properties of the soil at a depth of 0 to 30 cm are shown in table 2. The soil was moderately carbonated (4.53%), weakly alkaline (pH in H_2O - 7.39, and pH in KCl - 7.53), low humus (2.38%), well supplied N (0.27%), with high levels of available phosphorus and potassium 36.55 and 35.94 mg/100 g soil, Table 2.

Table 2. Laboratory analysis of the chemical analysis of chernozem soil samples.

Parameter	pH		$CaCO_3$	Humus	Total N	P_2O_5	K_2O
Depth, cm	KCl	H_2O		%		mg kg^{-1} N	
0-30	7.39	7.53	4.53	2.38	0.27	36.55	35.94

In Serbia, chernozem is the most fertile soil, with high agricultural productivity and occupies approximately 1.200.000 ha in Serbia. The main chernozem zone is in Vojvodina (46% of the total Serbia territory) [19, 20].

Meteorological data

Meteorological data were taken from the meteorological station in Bački Petrovac, Figure 1. Average air temperatures in the growing season 2022 were 20.84°C and were higher than the reference period (1987-2017, 18.90°C), by 1.94°C, while total precipitation was 182.0 mm, and were smaller compared to the reference period (314.4 mm), by 132.4 mm, Figure 1.

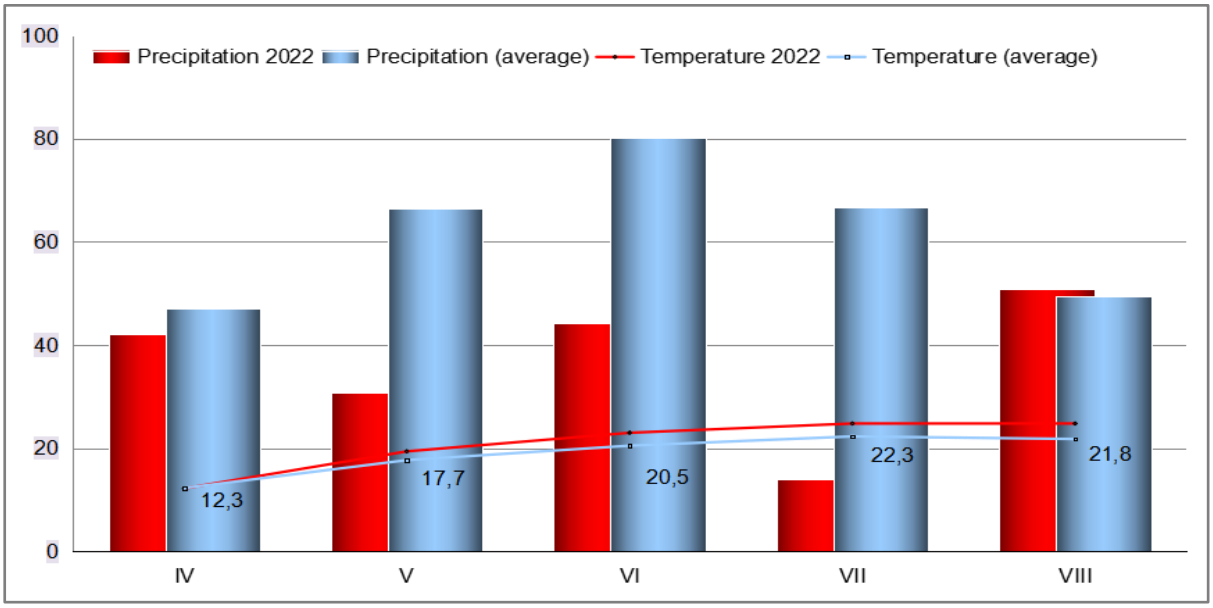


Figure 1. Total precipitation, mm, and average temperature, C, Bački Petrovac, 2022

Climate change is evident. Based on climate models, we can expect an increase in air temperature, a change in the amount and distribution of precipitation, and an increase in the frequency of extreme weather events [2].

Results and Discussion

Genotype, Variant and interaction G x V have statistical significant effect on all tested parameters, Tables 3 and 4. The average linseed grains yield, for both varieties and both variants, was 1.33 t ha^{-1}. In 2022, the average grain yield of linseed varieties NS Primus and NS Marko in the control variant amounted to an average of 1.27 t ha^{-1} while the variant with foliar nutrition 1.38 t ha^{-1}. The variety NS Marko had a 7.8% or 5.9% higher grain yield compared to the NS Primus variety (Table 3). The average

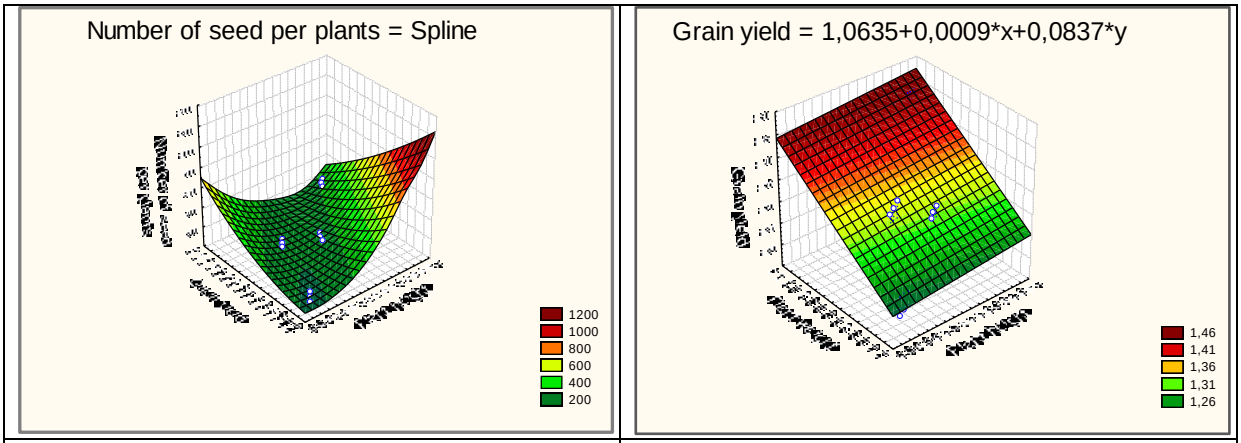
plant mass, for both varieties and both variants, was 2.67 g. The average plant mass of NS Primus and NS Marko varieties, in the control variant amounted to an average of 2.07 g while the variant with foliar nutrition 3.27 g. Genotype NS Marko had a statistically significant higher plant mass compared to NS Primus. The average plant height, for both varieties and both variants, was 44.82 cm. The average plant height of NS Primus and NS Marko varieties, in the control variant amounted to an average of 40.60 cm while the variant with foliar nutrition 49.10 cm. Genotype NS Marko had a statistically significant higher plant height compared to NS Primus. The average NoSP - number of seed per plants, for both varieties and both variants, was 44.82 cm. The average NoSP of NS Primus and NS Marko varieties, in the control variant amounted to an average of 40.60 cm while the variant with foliar nutrition 49.10 cm. Genotype NS Marko had a statistically significant higher value for NoSP compared to NS Primus, Tables 3-4, Figure 2a-2b. The length of the vegetation period for the variety NS Primus was on 120 and 126 days for NS Marko [2].

Table 3. Linseed productivity parameters on chernozem in 2022, Bački Petrovac

Parameter	V1- Control	V2	Average	IV
Grain yield, t ha^{-1}				
NS Primus	1.21±0.02	1.35±0.01	1.28±0.08	0.14
NS Marko	1.32±0.03	1.43±0.02	1.38±0.06	0.11
Average	**1.27±0.06**	**1.39±0.05**	**1.33±0.09**	**0.12**
Plant mass, g				
NS Primus	1.75±0.01	2.58±0.05	2.17±0.45	0.85
NS Marko	2.39±0.02	3.95±0.13	3.17±0.85	1.56
Average	**2.07±0.35**	**3.27±0.75**	**2.67±0.84**	**1.20**
Plant height, cm				
NS Primus	34.00 ±1.00	40.10±0.72	37.05±3.44	6.10
NS Marko	47.20±0.85	58.10±0.86	52.67±6.01	10.90
Average	**40.60±7.27**	**49.10±9.88**	**44.85±9.39**	**8.50**
No of seed per plants				
NS Primus	90.00±1.09	130.10±0.85	110.05±21.79	40.10
NS Marko	140.20±0.72	218.00±1.00	179.10±42.62	118.00
Average	**115.10±27.51**	**174.05±48.15**	**144.58±48.43**	**78.95**

Parameter	**Grain yield**		**Plant height**		**Plant mass**		**No of seed per plants**	
LSD	**0.5**	**0.1**	**0.5**	**0.1**	**0.5**	**0.1**	**0.5**	**0.1**
G-Genotype	0.013	0.019	1.149	1.670	0.012	0.022	1.209	1.745
V-Variant	0.014	0.020	1.150	1.671	0.013	0.023	1.208	1.746
G x V	0.019	0.029	1.625	2.365	0.022	0.032	1.697	2.469

The variance analysis of linseed yield is shown in table 4. Based on the variance analysis, it can be concluded that there are significant differences in the yields between the variant with nutrition and the yield in the control (F_{ekp} = 468.7**).



a. b.

Figure 2. 3D effect of linseed productivity parameters in 2022, Bački Petrovac. a.) 3D effect of linseed number of seed per plants, grain yield and plant height; b.) 3D effect of linseed grain yield, plants mass and plant height;

Table 4. ANOVA for tested parameters

Effect	SS	Degr. of Fr.	MS	F	p
Grain yield					
Intercept	21.14708	1	21.14708	211470.7*	0.00000
Genotype	0.02707	1	0.02707	270.7**	0.00000
Variant	0.04687	1	0.04687	468.7**	0.00000
Genotype x Variant	0.00068	1	0.00068	6.7*	0.03171
Error	0.00080	8	0.00010		
Plant height					
Intercept	24138,27	1	24138.27	320400.36	0.00000
Genotype	730.08	1	730.08	979.97	0.00000
Variant	216.75	1	216.75	290.94	0.00000
Genotype x Variant	17.28	1	17.28	23.19	0.00133
Error	5.96	8	0.75		
Plant mass					
Intercept	85.33333	1	85.33333	640000.0*	0.00000
Genotype	3.02003	1	3.02003	22650.2**	0.00000
Variant	4.29603	1	4.29603	32220.2**	0.00000
Genotype x Variant	0.40333	1	0.40333	3025.0**	0.00000
Error	0.00107	8	0.00013		
No of seed per plants					
Intercept	250823.2	1	250823.2	308723.2*	0.00000
Genotype	14303.7	1	14303.7	17604.6**	0.00000
Variant	10425.3	1	10425.3	12831.1**	0.00000
Genotype x Variant	1066.0	1	1066.0	1312.0**	0.00000
Error	6.5	8	0.8		

Based on the variance analysis it can be concluded that there are significant differences between the variant of nutrition and the plant height, plant mass and No of seed per plants in the control (F_{ekp}=290.947**, F_{ekp}=32220.2** and F_{ekp}= 12831.1**), Table 4.

Correlations of the examined factors

Correlations of the examined factors are shown in table 5. The degree of connection between individual components of flax yield is of great importance in selection, because in the case of genetic interdependence between traits, selection within one can condition the change of another trait. Highly significant positive correlation coefficient values were obtained between grain yield (GY) and plant height (r=0.89*), as well as GY and plant mass (r=0.94*), between GY and NoSP (r=0.93*), table 5. Highly significant positive correlation coefficient values were obtained between plant mass (PM) and PH- plant height (r=0.83*), as well as PM and NoSP (r=0.99**), and between NoSP and PH (r=0.97**), table 5.

Table 5. Correlations of the examined factors

Variable	Variant	PH	NoSP	PW	GY
Plant height - PH	0.47	1.00	0.97**	0.93**	0.89**
Number of seed per plant-NoSP	0.64*	0.97**	1.00	0.99**	0.93**
Plant weight	0.75*	0.93**	0.99**	1.00	0.94**
Grain yield	0.79*	0.89**	0.93**	0.94**	1.00

The influence of year and nutrition on the grain yield of linseed was determined by Popović et al. [19]. The average seed yield of NS Primus was 1.30 t ha^{-1}, while of the oil yield and protein yield in seed was 531.44 kg ha^{-1} and 291.85 kg ha^{-1}. The stated results can represent guidelines for further work in the breeding of this oil seed, in order to improve the yield and quality of oil seeds, because until now in our country no significant attention has been paid to this issue [2, 13].
By increasing the level of mineral nutrients to the optimum, the yield of linseed also increases. With the intensive technology of growing linseed (using 80 kg N ha^{-1}, and using herbicides; Linurex 50 WP, Fusilade Forte 150 EC, Glean 75 WP), compared to economical technology (using 40 kg N ha^{-1}, without herbicides), the flax seed yield was significantly increased for both varieties (average 80-102%) [21]. By increasing the level of mineral nutrients, Klimek Kopyra et al. [22]. Obtained an increase in the content of palmitic and oleic acids, while the proportion of α-linolenic acid was reduced. Andruszczak et al. [21], state that by increasing mineral nutrients, the Szafir variety had a significantly higher seed yield and protein content, while the Oliw in variety had a higher oil content.

Linseed benefit for health

Linseed grain yields depend on the applied production technology, cultivation location and environmental conditions. All the ingredients of linseed (oil, proteins, dietary fiber, phytoestrogens, mucilage, vitamins) offer health benefits, so they can be

used for medical purposes such as functional food or pharmaceutical products [2, 3, 10, 19], table 6, Pictures 2b-c, 3-4. Linseed contains up to 45% oil. Linseed oil has a favorable composition of fatty acids with a high content of linolenic acid and an excellent raw material for nutrition and medicinal purposes. Omega-3 polyunsaturated fatty acids (PUFA) have been shown to have therapeutic effects potential in several indications in neurology, psychiatry and cardiovascular diseases. Quality linseeds are greatly influenced by weather conditions in the year of linseed production. Results show that high seed quality is the first prerequisite for the timely application of the correct variety cultivation technologies, from sowing to harvesting. The correct application of cultivation technology measures is obtained high quality linseed. Due to the weak root system and specific ecological requirements in during the ripening period, oil linseed belongs to crops that are very sensitive to extreme weather conditions [2, 3, 10, 11, 12, 13, 19]. Linseed has the greatest need for water in its stages intensive growth and flowering in May and June. The quality of linseed is greatly depended of the harvest date. A better quality of linseed is obtained when the harvest is planned until mid-July [9, 12]. Linseed is rich in ALA, a type of omega-3 fatty acid that offer numerous benefits for heart health. Also, it's loaded with nutrients and linked to numerous benefits, Table 6, Pictures 4-5. The chemical and mineral composition of linseed consists of: proteins 22.52%, ash 3.79%, crude fiber 6.55%, oil 40.62%, calcium 0.40%, phosphorus 0.58%, iron 62.53 mg /kg, magnesium 1832.98 mg/kg, manganese 20.99 mg/kg, potassium 7006 mg/kg, zinc 69.18 mg/kg [10,13], Table 6.

Table 6. Nutrition value and facts per 100 g of linseeds- natural super food

Parameters	**Vitamins**	**%**	**Parameters**	**Minerals**	**%**
Energy, Kcal	**535**		**Carbohydrates, g**	**28.9**	
Fats, g	**40.6**		**Saturates fats, g**	**3.7**	
Polyunsaturates, g	**28.8**		**Monounsaturates, g**	**7.6**	
Proteins, g	**22.5**		**Dietary Fiber, g**	**28.3**	
Omega- 6, g	5.9		**Crude Fiber, g**	6.6	
Omega- 3, g	22.5	938	**Sugar, g**	1.6	
Ash, %	3.8		**Water, %**	7	
Folates, µg	87.0	22	**Sodium, mg**	30.1	2
Niacin, mg	3.1	19	**Potassium, mg**	814.1	17
Pantothenic acid, mg	1.0	21	**Calcium, mg**	255.1	22.5
Piridoxine, mg	0.5	36	**Iron, mg**	5.8	72
Riboflavin, mg	0.2	12	**Magnesium, mg**	392.1	98
Thiamin, mg	1.7	138	**Copper, mg**	1.1	124
Vitamin A, IU	0	0	**Zinc, mg**	5.4	39
Vitamin C, mg	0.6	1	**Manganese, mg**	2.9	109
Vitamin E, mg	20.0	14	**Selenium, mg**	4.5	
Vitamin E, µg	4.3	3.5	**Cholesterol, mg**	0	

Linseed is a rich source of the omega-3 fatty acid, alpha linolenic acid, the lignan secoisolariciresinol diglucoside and fiber. These compounds provide bioactivity of

value to the health of animals and humans through their anti-inflammatory action, anti-oxidative capacity and lipid modulating properties. The benefits of administering linseed or the individual bioactive components on health and some disease have been established. Dietary linseed in a variety ways has the effect of cardiovascular diseases, cancer, gastro-intestinal health and brain development and function, as well as hormonal status in menopausal women [6, 25], Puctures 3-5.

Picture 3. Health benefit of linseed

Picture 4. Health benefit of linseed oil

Picture 5. Health benefit of linseed ground

Four common forms of using linseed available for human consumption include whole linseed, ground linseed, linseed oil and partially defatted linseed meal [6]. A new form available in the marketplace is linseed "milk" (Pizzey Ingredients Inc, Manitoba, Canada). Linseed milk is finely milled linseed mixed with filtered water and other minor compounds an d are alternative to "milks", like almond milk. Linseed milk is rich in ALA and is an excellent alternative to dairy milk, as it has no cholesterol or lactose. It is suitable for people allergic to soybean, nuts and gluten, and it contains more health benefits than almond milk [6]. Supplementation of the diet with milled linseed has many healthy benefits to the body. Although cardiovascular disease and cancer are probably the best researched areas that have shown convincing evidence of a beneficial action for dietary linseed, other areas like gastro- intestinal health and diabetes have also recorded the beneficial effects of dietary linseed [6, 23, 24, 25, 26].
SDG - lignan secoisolariciresinol diglucoside is a very potent hypotensive agent. Linseed oil decreases platelet aggregation and increases platelet activating inhibitor-1 and so bleeding time. SDG is a potent angiogenic and antiapoptotic agent that may have a role in cardioprotection in ischemic heart disease. Linseed, FLC- flax lignan complex, and SDG - lignan secoisolariciresinol diglucoside, but not flaxseed oil, suppress atherosclerosis, and FLC and SDG slow progression of atherosclerosis. Flaxseed oil suppresses oxygen radical production by white blood cells, prolongs bleeding time, and in higher doses suppresses serum levels of inflammatory mediators and does not lower serum lipids [27].

Conclusions

Climate and soil composition are fixed factors that significantly affect agricultural production, which man, despite significant technological progress, cannot significantly influence. In 2022, the achieved linseed yields were at the level of the multi-year average. Tall temperatures and lack of precipitation in the critical stages of plant growth caused average yields. Since those varieties have shown that it is an important factor in linseed production, adaptation measures, such as adequate production technology and choice of appropriate foliar nutrition, are the most important in mitigating inappropriate weather conditions. Linseed is rich in ALA, a type of omega-3 fatty acid that may offer numerous benefits for heart health. Linseed contains nutrients called lignans that may help decrease cancer growth. Some studies link using of this food to a lowering risk of several types of cancer, but more research is needed. The Institute has seeds for sale of high-yielding linseed varieties of excellent quality: NS Primus and NS Marko. Economic benefits in our country can be created by the introduction, to a much greater extent, of linseed, in wide production.

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