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GROWTH PROSPECTS OF SUGAR BEET FOR BIOFUELS IN WESTERN STEPPE

Research of growing of sugar beets is conducted, as an alternative energy source from the vidnovlyuval'nikh resources of vegetable biomass.

Keywords: *sugar beets, hybrid, productivity, biomass.*

Introduction. Beet cultivation is an old and traditional branch in Ukraine , which occupies one of the essential positions in the country's economy. Production and processing of sugar beets is a zero waste technological process. [1]

Sugar beets are the basic source of raw materials for industrial sugar production. During the processing the pulp and molasses are being produced that are used for farm animal feeding. Sugar beets are a highly productive culture for sugar production and can be an important raw material base for other brunches, that is bioenergetics.

Bioenergetics is the most perspective direction of the renewable energy in Ukraine. It is based on the biomass energy use.

Nowadays, finding cheap biological materials, new technological solutions of growing the bioenergy cultures as well as processing of biomass into different kinds of biofuels is relevant.

Soil and climatic conditions of our country make it possible to grow energy cultures which are capable of rapid sun energy accumulation along with high biomass yield during the vegetation period.

Sugar beets is the most effective sugar containing culture for bioethanol production. This culture is defined to be of high potential output (45 – 70 t/ha). It is possible to get up to 6 thousand liters of bioethanol out of 1 hectare of sugar beets [2].

Therefore, the need for beet materials increases. Nonetheless, crop capacity in Ukraine is still on its low level. That is why the selection of highly-productive hybrids as well as the improvement and enhancement of cultivation technology of the sugar beets as the raw materials remain relevant.

The materials and methods of research. The improvement of technological processes of sugar beets cultivation for production of biofuels was held in Volyn State Agricultural Research Station within 2011 – 2013.

The experiments were laid on sod-podzolic light loamy soils that contain 1,49 – 1,84% of humus in 0 – 30 cm soil layer, 6,70 – 7,07 mg of light hydrolysis nitrogen per 100g of soils, 8,05 – 13,60 mg of mobile phosphorus per 100 g of soils and 12,70 – 14,20 mg of conversion potassium per 100 g of soils.

The amount of accounting area was 25 m², triple repetition. According to the experiment the sugar beets were cultivated by the generally accepted technology, the Ukrainian hybrid ЧС - 72 – had been sown.

The results of research. According to the results of the studies the following was determined – when sowing green manure culture, namely white mustard before sugar beets and bringing in such fertilizers as N₁₈₀, P₁₆₀, K₂₄₀ the yield of edible root has been increased in 21,9 t/ha in comparison with the monitoring area where no fertilizers has been brought in.

On the certain variants where fertilizers have been brought in and the harvesting took place in October, 1 – the sugar content is higher in 2,3%.

The increase of edible root crop capacity and its sugar content will provide the receiving of such supplement production as bioethanol and biogas. According to our calculations, it is possible to receive up to 4288kg/ha of bioethanol or 12768 m³/ha of biogas when the yield makes 54,6 t/ha and the sugar content is 17,42%. Respectively

the bioethanol energy output will be 107200 MJ/ha and the output of biogas will be 278342MJ/ha. (table1)

Table 1

**Yield capacity and bioethanol or biogas output
in dependence of fertilization and the terms of harvesting**

Fertilization	Date of collection	Yield capacity of sugar beets t/ha				yield capacity of tops, t/ha	sugar content, %	Bioethanol, kg/ha	Biogas, m ³ /ha	Bioethanol energy output MJ / ha	Biogas energy output MJ / ha
		2011	2012	2013	Average						
Monitoring: white mustard as a green manure	01.09	30,3	30,9	29,9	30,4	21,7	15,12	2280	7642	57000	166596
	01.10	32,3	31,7	31,1	31,7	20,8	16,42	2472	7786	61800	169734
White mustard as a green manure + N ₁₂₀ P ₁₀₀ K ₁₆₀	01.09	40,7	40,8	41,2	40,9	30,1	15,24	3087	10372	77175	226109
	01.10	44,6	44,6	45,3	44,8	29,7	16,82	3539	11034	88475	240541
White mustard as a green manure + N ₁₈₀ P ₁₆₀ K ₂₄₀	01.09	46,4	46,3	47,2	46,6	33,9	15,72	3578	11778	89450	256760
	01.10	53,3	53,0	54,5	53,6	31,2	17,42	4288	12768	107200	278342

Data indicate that it is possible to get a high yield and sugar content of the sugar beets which increase the production of biofuels if optimally fertilize, select hybrids and by favorable weather climatic conditions.

Nowadays, we grow sugar beets as a raw material for sugar, yet in the future we need to enhance the edible root crop as a perspective raw material for biofuels production.

Our research point out that it is necessary to improve the elements of growing technologies and selection of the new highly productive hybrids that would allow to enlarge and reduce the cost of beet industry.

Conclusions. The results showed that sugar beets productivity has been increased in 21,9 t/ha after bringing in the N₁₈₀ P₁₆₀ K₂₄₀ and harvesting in October,1.

Sugar beets cultivation as an alternative energy source which needs to be studied towards the improvement of the elements of technology and hybrids selection with regard to zonal features.

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Анотація

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Перспективи вирощування цукрових буряків для виробництва біопалива в умовах західного Лісостепу

Проведено дослідження вирощування цукрових буряків, як альтернативного джерела енергії з відновлювальних ресурсів рослинної біомаси.

Ключові слова: цукрові буряки, гібрид, урожайність, біомаса.

Аннотация

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Перспективы выращивания сахарной свеклы для производства биотоплива в условиях западной Лесостепи

Проведены исследования выращивания сахарной свеклы, как альтернативного источника энергии с возобновляемых ресурсов растительной биомассы.

Ключевые слова: сахарная свекла, гибрид, урожайность, биомасса