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## METHOD FOR DETERMINING THE QUALITY OF SVITCHGRAS SEED

*Features of svitchgras seed germination is shown in the article. It is proved that the reduction of seed resting state of this culture and respectively - increase of its intensity of germination is possible by the way of its germination under a constant temperature of 20 °C after pre-cooling of seed at a temperature of 10 °C during 14 days. It is definite the dates of account of sprouted seeds that characterize its energy of sprouting and germination. The intensity of svitchgras seed germination during their sprouting is differently influence the temperature of germination and cooling of seed it is established. Thus, on the initial stages of germination is significantly influenced the temperature of germination, and later - cooling of seed before their sprouting.*

**Keywords:** bed humidity, temperature, cooling of seed, germination, resting state

**Introduction.** Reproduction of svitchgras (*Panicum virgatum* L.) is possible by seed and rhizomes, but the most favorable way is reproduction by seed. This culture has relatively small sizes of seed with high levels of dormant state, especially immediately after the harvest. According to high level of dormant state seed germination may be only 5%, and in the field conditions such seed does not germinate. Given that svitchgras seed has a high level of dormant state, then use existing methods of analyzing; it is not possible to determine its biological similarity.

Dormant state can break in different ways, but most of them are based on stressful conditions creating during seed germination or before it sprouting. For example, for violation of dormant state the seed of vegetable and flower crops are preliminary cooling at a temperature of 5-10 ° C, which are placed on a wet substrate during 7 days. Seed of separate species of plants is germinated on humidified substrate by 0.2% solution of potassium nitrate (KNO<sub>3</sub>) or hiberylin acid solution. Mechanical methods are also used such as scarification [1, 2]. Seed of separate cultures, such as tropical and subtropical preliminary is heated. If on seed there are substances that its germination inhibiting, or seed with a hard shell, it is soaked [3, 4]. There are other ways to violation dormant state of seeds.

*Analysis of the latest research and publications.* On methods for determining of sowing qualities of seed of agricultural crops developing were working Kindruk M., A. Slyusarenko; B. Hechu; B. Malasay et al. (agricultural cultures) [5] A. Musienko, V. Kuznyechykova, A. Kobko, K. Bidulya (sugar beet) [6]. However, these methods cannot be used for svitchgras seed quality determining that characterized by a long dormant state.

The purpose of our research was method for determining the biological germination of seed of this culture for which would be disturbed dormant state developing.

**Materials and methods of researches.** Researches were conducting in the laboratory of seed production and seeding of beets and bioenergy cultures of Institute of bioenergy crops and sugar beet NAAS during 2011-2013. In experiment were used the seed after primary treatment, which is grown on Yaltushkivskiy experimental breeding station. In order to find the factors that have taken out the germ of svitchgras seed from the dormant state and method for determining the biological similarity for its germination developing, the scheme of experiment was study the effect of different state of bed wetting (15 to 35 ml/ cuvette water with intervals 5 ml) and germination of seed in thermostat both variable temperature - 8 hours at 10 ° C and 16 hours at 20 ° C, and with a constant temperature without cooling 20±2°C without cooling and when it is cooled during 5 to 14

days (temperature's stress) during 28 days envisaged. In the process of cooling (5-14 days) by the temperature's stress calculations of sprouted seed are not carried out. The calculations of sprouted seed is conducted only in its germination at a variable and constant temperature, respectively - 10 and 20±2°C and 20±2°C.

**Research results.** One of the factors that can create a stressful situation for seed is insufficient or excessive wetting of the bed at its germination. It is established that the best germination of svitchgras seed at a humidity for bed, which of amount of water created from 20 to 30 ml/ cuvette (Table 1).

So, on the 7th day after sowing at the humidity of 15-25 ml/cuvette of water is received 10-11 stairs, and at the humidity of 30 ml/cuvette of water - 14 stairs or in accordance 59-61% and 74% from the total number of sprouted seed.

*Table 1*

**Influence of bed humidity on the intensity of svitchgras seed germination**

Day of accounting after sowing	Number of sprouted seed (%) at a humidity of bed (ml/ cuvette of water)					SSD <sub>05</sub>
	15	20	25	30	35	
4-th	3	3	5	6	3	3,4
5-th	6	6	7	10	6	3,7
6-th	9	9	9	13	9	3,5
7-th	11	10	11	14	10	3,2
11-th	14	15	16	17	13	2,9
12-th	14	16	16	18	13	2,7
13-th	15	16	16	18	14	2,2
14-th	15	16	17	18	14	2,6
20-th	16	17	18	19	18	2,3
26-th	16	17	18	19	18	2,1
30-th	16	17	18	19	19	2,5

According to amount of water to 35 ml/cuvette increasing the number of seed that sprouted was reduced to 10. Similar results were obtained with the intensity of svitchgras seed germination in other times of accounting. Actually on the 20th day after sowing the stairs from all seed that can germinate was obtained. The number of germinated seed after 26 and 30 days after sowing was the same as on the 20th day. The bed for the germination of seed of this culture can be corrugated or consist of two non-corrugated strips on which after moistening seed sowing, put in a plastic bed, and one - sown seed covering after its moisturizing. Strips are moisturizing with distilled water before sowing at least 30 minutes. In a plastic bed is seed sowing of two repetitions of 100 pieces. Strips of filter paper should be 116±3 mm width, 208±3 mm length. That this size they can hold 20-30 ml of water, that quantity of by which the most intense seed germinating. The use of bed in the form of strips of filter paper is simplifies seed sowing compared with corrugated paper where necessary to lie out of eight seed in each cell.

So as insufficient and excessive moistening of bed in his germination is influencing on the intensity of seed germination but is not decisive for the significant reduction in its dormant state and the number of sprouted seed increase. Therefore, a study was conducted on the influence of temperature regime on germination of dormant state of seed embryo.

At seed analyzing the sown samples are taken from the working sample immediately without a choice. Working sample seed - isolated from an average sample of seed to determine the specific parameters of its quality [7]. Determination of the intensity of germination is spending on four cultivated samples, each consisting of 100 seed.

It is established a significant effect of germination temperature on the intensity of svitchgras seed germination. Thus for seed germination at constant temperature it is intensive germinating than in variable temperature (Table. 2).

Thus, on the seventh day of accounting seed that sprouted at a constant temperature of 20 °C without pre-cooling was 12 stairs, then at the variable temperature on this day there was no stairs. In later dates of accounting (14, 20 and 28 days) in these variants better germinate seed at a variable temperature due to the minor stress of low temperature of germination.

Previous cooling of seed and its term is considerably influenced on the intensity of its germination. Even cooling during four days is provided intensity increasing of germination on the seventh day after sowing at a constant temperature of 20 °C on 15% compared with control (SSD<sub>05</sub> = 4.1%). According of seed germination at variable temperature after pre-cooling during four days on the 10th and subsequent accounting dates the intensity of germination was significantly higher than the germination at constant temperature, due to the influence of low temperature on the dormant state as of seed in the period of cooling and in the period of its germination

Table 2

**Intensity of seed germination depending on the condition of its sprouting**

Variant		Sprouted seed,% per day					
temperature of germination (factor A)	cooling period, days at a temperature of 10 °C (factor B)	4-th	7-th	10-th	14-th	20-th	28-th
		20°C	without cooling, control	0	12	15	19
4	9		27	36	38	39	39
7	27		36	40	41	42	43
14	58		59	61	62	63	63
at a variable temperature: 10°C – 8 hours, at 20°C 16 hours	without cooling, control	0	0	0	25	41	49
	4	0	1	35	38	44	48
	7	0	9	22	37	43	49
	14	25	37	42	48	55	56
SSD <sub>05</sub> total		5,8	5,8	6,5	7,7	8,1	6,6
SSD <sub>05</sub> factor A, temperature		2,9	2,9	3,2	3,7	4,0	3,3
SSD <sub>05</sub> factor B, cooling period		4,1	4,1	4,6	5,5	5,7	4,7

Most intensive seed is sprouted at a constant temperature of germination after previous cooling during the 14 days. Under these conditions immediately on the fourth day of accounting was 58% sprouted of seed at the same time as for cooling during seven days - only 27%. (SSD<sub>05</sub> = 4.1%). On 20-th day of accounting all similar seed were sprouted. At a variable temperature of germination at a cooling of seeds during 14 days of germination the intensity was significantly lower than at a constant temperature.

It is established that the intensity of switchgrass seed germination is significantly influenced on the initial stages of germination – temperature of germination and further - seed cooling before its germination (Table. 3).

Table 3

**The share of factors influence depending on the term of seed germination**

Accounting of seed that sprouted per day after sowing	Share of factors influence, %		
	temperature of germination	seed cooling	others
4	57	20	23
7	76	15	9
10	14	78	8
14	1	81	18
20	3	67	30
28	8	56	36

Thus, in the fourth and seventh day share the influence of temperature of germination was

57 and 76%, on the 10th day it decreased to 14% in the future, this share did not exceed 8%. And vice versa, the share influence factor "cooling" in the early stages of germination was 15-20%, and subsequently it increased to 56-78%.

Considering the research results the calculation of sprouted seed should be performed on the seventh (168±2 hours) and twentieth day after sowing. Day of seed bookmarks for germination and day of sprouted seed accounting is considered as one day. Before sprouted seed are such that during germination give one sprout. To unlike seed is include all seed that during of germination on the 20th day did not produce seedlings.

During the germinated seed calculation on the seventh day the numbers of sprouted seed is counting and remove it from the bed. On the twentieth day is counting all sprouted seed.

In the period of seed germination is needed; thermostat aired daily at the beginning middle and ends of the day; check the bed moistening to prevent it from drying; daily to control the automatic regulation of temperature and humidity.

The results of studies were used for developing the method for determining svitchgras seed quality that provides reduction its dormant state and consequently - seed germination providing.

### **Conclusions**

1. Previous cooling of seed under low temperature of 10 ° C during 14 days and its subsequent germination at a constant temperature of 20 °C is provided reducing seed dormant state and increase the intensity of its germination. On the seventh day of seed accounting is received 93.6% of normally germinated sprouts of the total number of similar of seed, and on the 20th date all similar of seed were sprouted. Under these conditions of germination on the 20th day is received the maximum biological similarity. It is believed that the number of normally germinated seed on the seventh day is characterizes their vigor, and on the twentieth day - their laboratory germination.

2. On the intensity of svitchgras seed germination is significantly influenced the initial stages of germination - temperature of germination and further - cooling of seed before its germination.

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### **Анотація**

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Метод визначення якості насіння світчграсу**

*У статті висвітлені особливості пророщування насіння світчграсу. Доведено, що зменшення стану спокою насіння цієї культури і відповідно – підвищення його інтенсивності проростання можливе шляхом його пророщування за постійної температури 20°C після попереднього охолодження насіння за температури 10°C упродовж 14 діб. Визначено дати обліку пророслого насіння, які характеризують його енергію проростання та схожість. Встановлено,*

що на інтенсивність проростання насіння світчграсу впродовж його пророщування по різному впливають температура пророщування та охолодження насіння. Так, на початкових етапах проростання істотно впливає температура пророщування, а в подальшому – охолодження насіння до його пророщування.

**Ключові слова:** вологість ложе, температура, охолодження насіння, схожість, стан спокою

#### **Аннотація**

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#### **Метод определения качества семян свитчграса**

В статье освещены особенности проращивания семян свитчграса. Доказано, что снижение состояния покоя семян этой культуры и соответственно – повышение их интенсивности прорастания возможно путем проращивания семян при постоянной температуре 20°C после предварительного охлаждения их при температуре 10°C в течение 14 суток. Определены даты учета проросших семян, которые характеризуют их энергию прорастания и всхожесть. Установлено, что на интенсивность прорастания семян свитчграса на протяжении их проращивания по-разному влияют температура проращивания и охлаждения семян. Так, на начальных этапах прорастания существенно влияет температура проращивания, а в дальнейшем – охлаждения семян до их проращивания.

**Ключевые слова:** влажность ложа, температура, охлаждение семян, всхожесть, состояние покоя