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SVITCHGRAS SEEDS QUALITY DEPENDING ON SORTING METHODS

It is established that svitchgras seeds sorting both aerodynamic properties and specific mass provides its germination intensity increased. The best sorting regime by aerodynamic properties is such from which in retreat gets no more than 20% of seeds. The best regime of pneumatic table is: pneumatic table working surface inclination angle - longitudinal 2.50, transverse 0.50, air speed at which is the working surface is uniformly seeds covered and pneumatic table worktop frequency fluctuations 440 oscillations/minute, which provides germination intensity increased at 23 -38% compared with the control (without sorting).

Keywords: *svitchgras, sorting, germination, specific mass, aerodynamic properties.*

Introduction. Svitchgras – is erecting a heat-loving plant like cereal bush. In the United States is used as lihnocellulose culture for biomass growing for energy production. It is new culture for Ukraine. But svitchgras growing on degraded lands, which in Ukraine about 5 million hectares, for the crops cultivation in order solid fuels production is important. This crop seeds reproduction is the most favorable way. There is no information about this culture in the literature almost. It is known that svitchgras is propagated by seed and rhizome. Seeds relatively small size with high dormant state is especially right after the harvest. Seed germination may have been only 5% with a high level of dormant state. One of the methods seed quality improves is sorting it by specific mass and aerodynamic properties that were our research goal.

Materials and methods. Research was spent at the Institute of bioenergy crops and sugar beet in 2011-2012. In the experiments were used after primary cleaning seed, which is grown on Yaltushkivska experimental breeding station. Seeds sorting were spent on laboratory aerodynamic column "Petkus" in aspiration channel by different speed air and laboratory Vestrub by cross angle of inclination pneumatic table work surface changing and frequency its vibrations from 425 to 440 oscillations per minute.

Research results and discussion. It is established that svitchgras seed sorting by aerodynamic properties are effective. Even at the air speed in aspiration channel of 5.8 m/sec. germination increased by 12%, and the mass of 1000 pcs - by 3.1 times compared with the control (Table 1).

Table 1.

Svitchgras seed quality depending on sorting regime by aerodynamic properties (average of 2011-2012)

Variant		1000 pcs mass., g	Germinated seed, %. per day					
scale graduation	air speed in aspiration column, m/sec		5	7	10	14	20	28
Without sorting - control		0,13	8	21	23	25	26	27
35	5,2	0,38	10	25	28	30	31	32
40	5,8	0,40	10	28	33	30	38	39
45	6,4	0,44	19	32	36	38	40	40
50	7,0	0,46	17	35	38	42	44	45

Air speed to 6.4 m/sec increasing did not provide a significant increase in seed germination compared with the variant where the air speed was 5.8 m/sec., and seeds loss in care increased to 22% (Fig. 1).

Further air speed increase in aspiration column (up to 7 m/sec.) also provided seed germination and its mass of 1000 significant increase compared with the control, but with the variant where the air speed was 5.8 m/sec. there was a tendency these

indexes increase. The seed output for sowing was only 16.8% and over 83% of seeds were directed to waste.

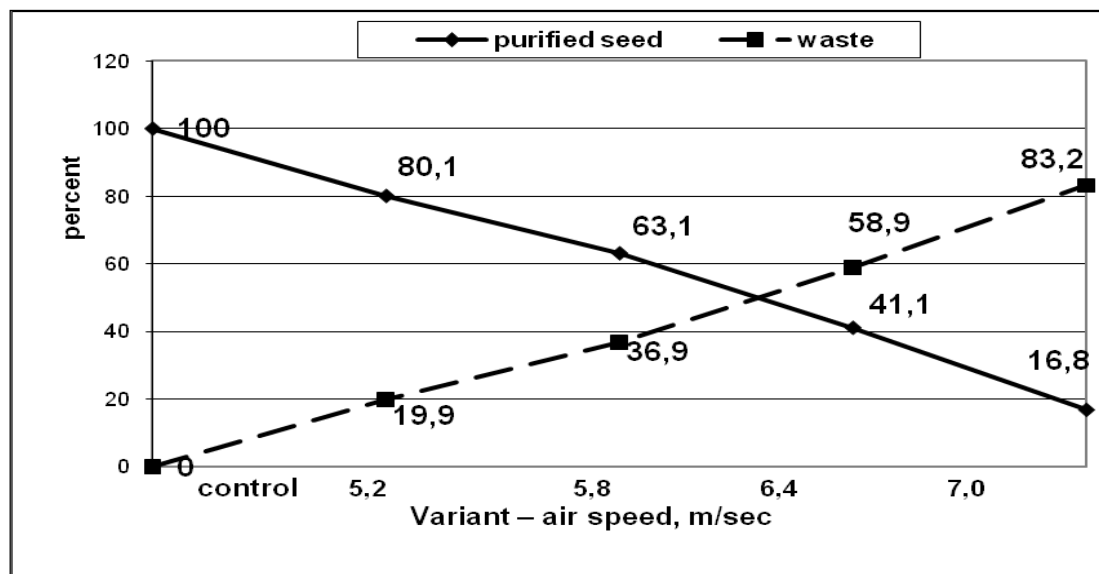


Fig. 1. Seed output and its loss by aerodynamic properties sorting
(average of 2011-2012)

Between air speed in aspiration channel and refined seed number is set back tight correlative connection. The correlation coefficient is - 0.84. Between air speed in aspiration column and number of seed that comes in waste is set direct correlative connection. The correlation coefficient is 0,84. The highest seed germination intensity was at the first 7 days irrespective of sorting regimes which ranged from 21-35% in control to 27-45% at sorting with air speed 7 m/sec.

Seed germination and mass of 1000 seeds increased is due to light and lower seed germination in the selection as evidenced by waste seeds quality (Table 2). Thus, air speed seed sorting in aspiration column 5.2 m/sec. number of sprouted seeds was low and was only 1-12%. With air speed to 6.4 m/sec. increasing number of germinated seed waste at 28 day of germination increased to 17% and at the maximum speed (7.0 m/sec.) – up to 20%. In the waste mass of 1000 seeds depending on the sorting regime was at 1,5-1,9 times lower than in purified seed.

Thus, switchgrass seed sorting by aerodynamic properties provides a germination significant increase.

Table 2.

**Svitchgras seeds waste quality depending on aerodynamic properties
sorting regime (average of 2011-2012)**

Variant		1000 pcs mass., g	Germinated seed, %. per day					
scale graduation	air speed in aspiration column, m/sec		5	7	10	14	20	28
35	5,2	0,20	1	9	11	11	12	12
40	5,8	0,24	1	12	14	15	15	15
45	6,4	0,28	1	12	15	15	17	17
50	7,0	0,30	3	18	17	19	20	20
	SSD ₀₅				1,3			2,6

Optimal sorting regime is such for whom in waste gets no more than 20% of seeds, providing refined seed germination significant increase. Svitchgras seed sorting by regimes when in waste gets over 20% of seeds is unnecessary and only leads to unjustified losses. This seed preparation method for sowing possible in every seed farm, where there is a sorting machine, equipped with aspiration channel.

Effective way of seed germination intensity increasing is sorting by specific mass, which provides not only easy seeds and not completely filled removal, which in laboratory conditions can grow, and in the field will not germinate.

Seed sorting quality by specific mass on pneumatic table depends on regime work, namely: work surface longitudinal and transverse angles of inclination, air speed, working surface oscillation frequency, and the number of seeds that were submitted for sorting. Given that researches have been conducted pneumatic table optimal regime determines.

It is established pneumatic table work surface inclination angles optimum longitudinal - 2.50, transverse 0.50 and air speed that ensure seed uniform coverage of its working surface, which affects on sorting quality. Under these parameters seed sorting by pneumatic table working surface oscillation frequency changing from 425 to 440 oscillations/minute provided germination intensity significant increase compared with the control (without sorting). Thus, on the control on 21 day only 50% seed sprouted, in the variant with a frequency of 425 oscillations / minute even at a

fraction of seed that is sent to re-sorting (position 4) - 73% seed sprouted, and in prepared seed (position 1 -3) - 79-88%. Analogous results were obtained at other sorting variants.

Most intensive seed sprouting from all sampling position as at 10 and 21 day of sprouting at sorting it with the working surface oscillation frequency of 440 oscillations/minute (Table 3).

Table 3

**Svitchgras seed quality depending on specific mass sorting regime
(average of 2011-2012)**

Variant - Sorting regime	Sampling position on pneumatic table	1000 pcs mass., g	Germinated seed, %. per day	
			10	21
Control		0,14	50	50
Inclination angle L = 2,5	1	0,16	83	82
Inclination angle D = 0,5	2	0,14	87	88
Air 1,7	3	0,16	81	79
Frequency oscillation 425 o/min.	4	0,16	72	73
	5	0,15	59	60
Inclination angle L = 2,5	1	0,16	89	89
Inclination angle D = 0,5	2	0,14	81	81
Air 1,7	3	0,14	81	82
Frequency oscillation 435 o/min.	4	0,14	70	71
	5	0,15	58	58
Inclination angle L = 2,5	1	0,16	94	94
Inclination angle D = 0,5	2	0,15	86	86
Air 1,7	3	0,15	80	82
Frequency oscillation 440 o/min.	4	0,16	61	62
	5	0,12	28	28

SSD₀₅ gen. 1,8

SSD₀₅ sorting factor 1,0

SSD₀₅ position factor 1,3

Into waste in this sorting regime seed falling with germination intensity of which was the lowest and accounted on sprouting 10 and 21 day of 28%. Under other

sorting regimes into waste seed is falling with intensity 70-73% sprouting indicating sorting poor quality.

There was no significant increase or decrease of 1000 mass by all regimes sorting, but it was higher than on the control. After 21 day between 1000 seeds mass and germinated seeds number established strong direct correlation. The correlation coefficient is 0.57. While factors determining that affect on sugar beet seed germination intensity established that "seed sorting" factor influence was 17% (Fig. 2).

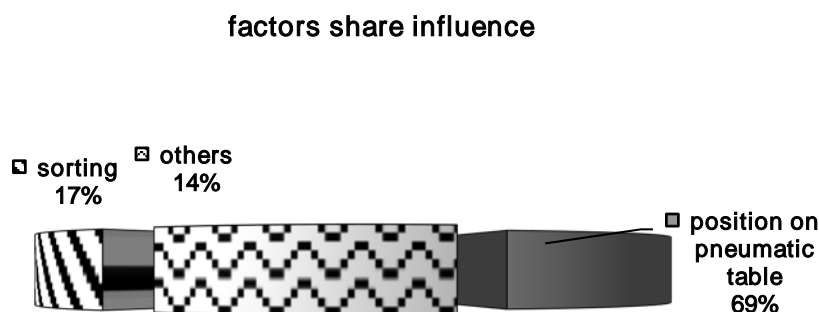


Fig. 2. Factors share influence on sprouting seed number on 21 day (average of 2011-2012)

On seed quality most affect its sampling positions on pneumatic table - 69%. Before sowing in all sorting regimes seed output was prepared in the range of 57.5 (second regime) to 61.5% (first regime) (Fig. 3).

On another sorting was directed 18,6-20,7% seeds, and into waste - 19,9-21,8%. There were not significant differences in these parameters depending on the sorting regime.

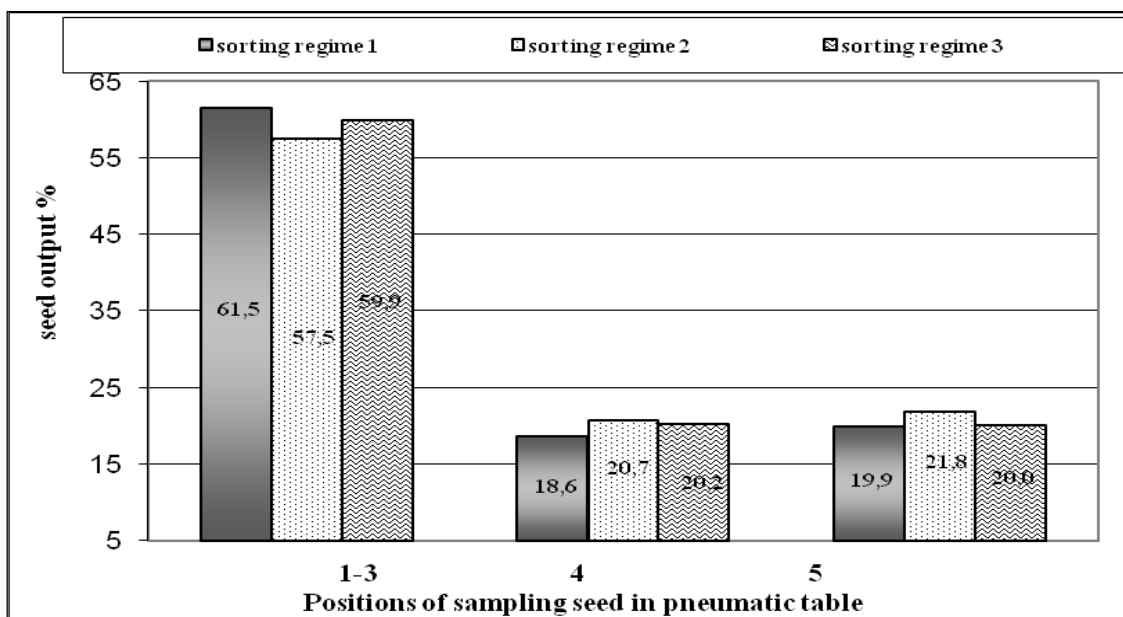


Fig. 3. Seed output depending on specific mass sorting regime

Conclusions. Svitchgras seed sorting both aerodynamic properties and specific mass provides sprouting intensity increase. The optimal sorting regime by aerodynamic properties is that in which into waste gets no more than 20% of seeds, providing a significant increase in refined seed germination. Svitchgras seed sorting by regimes when into waste gets more than 20% of seed are unnecessary and leads only to unjustified losses. This seed preparation method for seed sowing is possible in every seed farm, on which are sorting machines, equipped with aspiration channel. Under seed sorting by specific mass the optimal pneumatic table work regime are: pneumatic table work surface inclination angle longitudinal - 2.50, transverse – 0.50, and air speed that ensure seed uniform coverage of its working surface, working surface oscillation frequency of 440 oscillations/minute, enhances the germination intensity of 23-38% compared with control (without sorting).

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Анотація

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Якість насіння світчграсу залежно від способів його сортування

Встановлено, що сортування насіння світчграсу як за аеродинамічними властивостями, так і за питомою масою забезпечує підвищення інтенсивності його проростання. Оптимальним режимом сортування за аеродинамічними властивостями є такий за якого у відхід потрапляє не більше 20% насіння. Оптимальним режимом роботи пневмостола є: кут нахилу робочої поверхні пневмостола – поздовжній $2,5^{\circ}$, поперечний $0,5^{\circ}$, швидкість повітря така за якої робоча поверхня рівномірно покривається насінням і частота коливання робочої поверхні пневмостола 440 коливань/хвилину, що забезпечує підвищення інтенсивності проростання на 23-38% порівняно з контролем (без сортування).

Ключові слова: світчграс, сортування, схожість, питома маса, аеродинамічні властивості.

Аннотация

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Качество семян свитчграса в зависимости от способов его сортирования

Установлено, что сортирование семян Свитчграса как по аэродинамическим свойствам, так и по удельной массе обеспечивает повышение интенсивности их прорастания. Оптимальным режимом сортирования по аэродинамическим свойствам есть такой при котором в

отход попадает не более 20% семян. Оптимальным режимом работы пневмостола являются: угол наклона его рабочей поверхности – продольный 2,5°, поперечный 0,5°, скорость воздуха такая при которой рабочая поверхность равномерно покрывается семенами и частота колебания рабочей поверхности пневмостолах 440 колебаний / мин, что обеспечивает повышение интенсивности прорастания на 23-38% по сравнению с контролем (без сортирования).

Ключевые слова: *свитчграс, сортирование, всхожесть, удельная масса, аэродинамические свойства.*