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Report

on experiments measuring germination energy, laboratory germination rate, seed disease infection, and the length and mass of seedlings formed from flax **(oilseed and fibre varieties)** in relation to the use of the multifunctional preparation **Saver+** in modifications: **B, M, and C**.

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The results of measuring the **germination energy and laboratory germination rate of oilseed flax** seeds depending on their treatment with the **Saver+ preparation in modifications B, M, and C** are illustrated in Table 1.

Indicators of germination energy and laboratory germination rate of flax seeds significantly increased in all variants treated with the above preparations compared to the untreated control.

The highest germination energy level (95.75%) and laboratory germination rate (97%) of oilseed flax seeds in the experiment were achieved through treatment with the **Saver+ preparation, modification C**, at an application rate of 300 ml/t (Table 1).

Table 1 – Germination energy and laboratory germination rate of oilseed flax seeds (variety "Uralsky") depending on their treatment with the Saver+ preparation in modifications B, M, and C (2022)

Treatment Variant	**Germination energy, %**	**Laboratory germination rate, %**
1. Control (untreated)	75.0	81.5
2. Saver+ preparation B (300 ml/t)	94.5	96.5
3. Saver+ preparation M (300 ml/t)	93.0	95.25
4. Saver+ preparation C (300 ml/t)	95.75	97.0
$LSD_{0.05}$	1.25	1.25

After **treating oilseed flax** seeds with the **Saver+ preparation in modifications B, M, and C**, their **infection by diseases** significantly decreased (Table 2). For the fungal disease — speckled blotch — the lowest infection rate was observed in the variant treated with the **Saver+ preparation, modification C** (300 ml/t), amounting to 2.75%. The infection rate of seeds with this disease after treatment with all tested preparations was significantly lower than in the control. With a low initial infection of seeds by anthracnose and bacteriosis (2.5% and 3%), the **Saver+ preparation, modification C, as well as the other two modifications, were 100% effective against them**.

Table 2 – Seed disease infection rate (%) of oilseed flax (variety "Uralsky") depending on their treatment with the **Saver+ preparation in modifications B, M, and C** (2022)

Treatment Variant	**Anthracnose**	**Speckled blotch**	**Bacteriosis**
1. Control (untreated)	2.5	36.75	3.0
2. Saver+ preparation B (300 ml/t)	0	3.75	0
3. Saver+ preparation M (300 ml/t)	0	3.5	0
4. Saver+ preparation C (300 ml/t)	0	2.75	0
LSD_{05}		0.25	

The results of measuring the **germination energy and laboratory germination rate** of **fibre flax (long-stemmed)** seeds depending on their treatment with the **Saver+ preparation in modifications B, M, and C** are illustrated in Table 3.

For fibre flax as well, the **indicators of germination energy and laboratory germination rate were significantly higher in all variants treated with the polymer-based preparations compared to the untreated control.**

Confirming the consistent growth-stimulating effect of the studied products, as revealed in the experiment with oilseed flax seeds, the highest germination energy (96%) and laboratory germination rate (98.25%) of fibre flax seeds were achieved through treatment with the **Saver+ preparation, modification C**, at an application rate of 300 ml/t (Table 3).

Table 3 – Germination energy and laboratory germination rate of fibre flax seeds (variety "Lenok") depending on their treatment with the **Saver+ preparation in modifications B, M, and C** (2022)

Treatment variant	**Germination energy, %**	**Laboratory germination rate, %**
1. Control (untreated)	70.25	75.75
2. Saver+ preparation B (300 ml/t)	94.5	97.25
3. Saver+ preparation M (300 ml/t)	94.25	97.0
4. Saver+ preparation C (300 ml/t)	96.0	98.25
LSD_{05}	1.25	1.25

The **disease infection rate** of **fibre flax seeds** after treatment with the **Saver+ preparation in modifications B, M, and C** significantly decreased (Table 4). Against fungal infections (anthracnose and speckled blotch), the most effective again was **Saver+ modification C** at an application rate of 300 ml/t (as observed with oilseed flax). For bacteriosis, the lowest infection rate was also recorded in the variant treated with the same **Saver+ modification C** (300 ml/t).

Table 4 – Seed disease infection rate (%) of fibre flax (variety "Lenok") depending on their treatment with the **Saver+ preparation in modifications B, M, and C** (2022)

Treatment variant	Anthracnose	Speckled blotch	Bacteriosis
1. Control (untreated)	11.0	12.5	27.5
2. Saver+ preparation B (300 ml/t)	2.5	2.75	3.5
3. Saver+ preparation M (300 ml/t)	2.0	2.25	1.75
4. Saver+ preparation C (300 ml/t)	1.5	2.0	1.5
LSD_{05}	0.50	0.25	0.75

The growth-stimulating effect of the **Saver+ preparation in modifications B, M, and C** was further confirmed by the significant increase in the **length and mass** of seedlings formed from flax seeds 5 and 7 days after treatment with these agents and germination under "moist chamber" conditions.

All studied preparations, in all tested concentrations, generally had a positive effect on the length of seedlings of both **oilseed flax and fibre flax** (figure; Tables 5 and 6). The seedlings of flax obtained from seeds treated with the **Saver+ preparations (modifications B, M, and C)** significantly exceeded the control (untreated) in this parameter. The most effective treatment was with the **Saver+ preparation, modification C**, at the concentration corresponding to the application rate of 300 ml/t.

Fig. – Seedlings of oilseed flax (left) and fibre flax (right) from variants: control (C) and treated with Saver+ modifications B, M, and C (after 5 days of germination).

The mass of oilseed and fibre flax seedlings also increased significantly depending on seed treatment with the **Saver+ preparation in modifications B, M, and C** (Tables 5 and 6). The highest values were again obtained with seed treatment using the **Saver+ preparation, modification C** (300 ml/t).

Table 5 – Length and mass of oilseed flax seedlings (variety "Uralsky") depending on their treatment with the **Saver+ preparation in modifications B, M, and C** (after 7 days of germination, 2022)

Treatment variant	**Average seedling length, mm**	**Mass of 100 seedlings, g**
1. Control (untreated)	21.5	23.3
2. Saver+ preparation B (300 ml/t)	40.4	43.7
3. Saver+ preparation M (300 ml/t)	40.1	43.4
4. Saver+ preparation C (300 ml/t)	44.0	47.5
LSD_{05}	**0.3**	**0.2**

Table 6 – Length and mass of fibre flax seedlings (variety "Lenok") depending on their treatment with the **Saver+ preparation in modifications B, M, and C** (after 7 days of germination, 2022)

Treatment variant	**Average seedling length, mm**	**Mass of 100 seedlings, g**
1. Control (untreated)	23.1	24.9
2. Saver+ preparation B (300 ml/t)	42.7	43.6
3. Saver+ preparation M (300 ml/t)	42.0	43.3
4. Saver+ preparation C (300 ml/t)	45.5	48.4
LSD_{05}	**0.40**	**0.34**

Conclusion

Therefore, all the studied preparations in the experiments using “moist chambers” significantly influenced the increase in germination energy and seed germination of flax, as well as the reduction of fungal and bacterial infection in seedlings. The plants of **oilseed and fibre flax** obtained from seeds treated with the **Saver+ preparation in modifications B, M, and C** had a significantly greater length and mass compared to the control. The highest indicators of germination energy, seed germination rate, and seedling length and mass were observed when using the **Saver+ preparation, modification C**.