To calculate the SWR, it is necessary to calibrate the detector of the measuring line, and then determine the minimum and maximum electric field intensity from the graph. Then the maximum electric field intensity value is divided by the minimum value. The SWR value will range from one to infinity.

Along with the SWR, the most important characteristic of a wave is impedance. It is given by a complex number:

$$Z = R + jX, \tag{1}$$

where R and X are active and reactive resistance components correspondingly.

The impedance can be calculated using complex formulas or using the Wolpert Smith chart.

To achieve a consistent state in the transmission line, it is necessary to compensate for the reactive component of the impedance. For these purposes reactive dowel can be used, which is not used in high-power waveguides, since the electric strength of the waveguide decreases.

To clarify a few more characteristics, we introduce the concept of resonance. Resonance is a sharp increase in the amplitude of stationary oscillations when the frequency of external influence coincides with certain values characteristic of a given system. A cavity resonator is used to amplify power. The main characteristics of the cavity resonator are the resonant frequency and quality factor.

The unloaded Q factor of the resonator is the ratio of the energy stored in the resonator to the energy of losses during the oscillation period inside the resonator.

The loaded Q-factor is real Q-factor of the resonance system being part of an electric circuit. To determine it, one should measure the resonant frequency and the frequencies of half-power relative to the maximum power of the resonance.

Thus, all of the above values can be determined using large schemes and complex mathematical calculations. In real tasks quality factor, SWR, active and reactive components of the impedance, and other parameters of the RF devices are usually measured directly, with the vector network analyzer (VAC). VAC measures properties of the signal transmission through the device under test and the properties of the signal reflection from its ports.

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PRE-SEEDING SEED TREATMENT IN ELECTRIC FIELD

V. Pashynski, P. Velichko

Belarusian State University, ISEI BSU,
Minsk, the Republic of Belarus
Pashynski@mail.ru

Germination is the most important quality property of seed material which is determined in the laboratory. It is understood as the ability of seeds under optimal, standardized laboratory conditions to form a healthy, normally developed seedling within a certain period of time (root and shoot are normally developed). In a laboratory analysis of germination, % of germinating seeds of a given culture ("pure seeds") that germinate under these conditions are determined.

Electrical stimulation (pre-sowing treatment) of seeds is necessary to increase the energy of their germination, germination, crop yields, resistance to adverse weather conditions and reduce the growing season. When seeds are excited, cell division increases, moisture absorption increases, and the insufficient effect of natural electrophysical factors (solar radiation, temperature, etc.) is compensated.

In this paper, we consider the effect of an electric field on the germination of cereal seeds using barley cultivars as an example. For the experiment, eight samples of seed were taken. Each sample contained 100 units of barley grains. All samples were divided into two groups of four samples each. To disturb the period of physiological rest, an electric field of high tension was used. An SDL-1 dielectric seed separator was used to create an electric field. In the dielectric separator, the working bodies are a drum made of a dielectric material, on which two insulated conductors, which are electrodes, are wound (close to – turn to turn). A high voltage of 5 kV from a step-up low-power transformer was supplied to them. An inhomogeneous electric field was created between the conductors – electrodes, into which the studied seeds fell. The treatment was subjected to seed material consisting of four samples.

Seeds are sprouted on one or several layers of paper. The paper is then transferred to a Jacobson sprouting apparatus, into transparent Petri dishes (add the necessary amount of water at the beginning, prevent evaporation by tightly closing lids or packing in plastic bags), or directly by inserts in cabinets sprouting. The relative humidity in the cabinet should be close to saturation. After that, all the seeds, together with the untreated ones, were placed in Petri dishes on the bottom of which moist filter paper was laid. Germination paper should be 100 % bleached cotton pulp or other peeled pulp, have a loose and porous structure, pH 6.0...7.5.

Samples were counted twice, since the germination dates are different for different types of grains. At the first count, only normally germinated seeds are taken into account, the last – all seeds. Germination is determined by calculating the average of four repetitions of 100 seeds and expressing it as a percentage. The results are reliable only when the difference between the repetitions with the highest and least germination does not exceed the established limits.

Fig. 1. – Germination of seeds on the surface filter paper petri dish

All samples were placed in a thermostat, where a constant temperature was maintained (20 °C). To maintain humidity in the chamber, additional containers with water were used. On the fourth and seventh days, sprouted seeds were counted. In addition, on the seventh day, the number of seeds with normally formed seedlings was determined. The data obtained are summarized in table 1.

Table 1

Research results

Fourth day						
Processed seeds	Germination, %	Sample No.				
		1	2	3	4	Среднее
Untreated seeds		24	21	24	23	23
		9	2	8	1	5
Seventh day						
Processed seeds	Germination, %	98	100	99	100	99
	Normally Sprouted Seeds	61	83	74	53	68
Untreated seeds	Germination, %	100	98	100	96	98
	Normally Sprouted Seeds	34	10	54	6	26

All samples were placed in a thermostat, where a constant temperature was maintained (20 °C). To maintain humidity in the chamber, additional containers with water were used. On the fourth and seventh days, sprouted seeds were counted. In addition, on the seventh day, the number of seeds with normally formed seedlings was determined. The data obtained are summarized in table 1.

Analyzing the data of table 1, we can conclude that the electric field does have an effect on the biological processes of seed activity. The germination on the fourth day in the treated samples is 27 % higher than that in untreated samples. As for the seventh day, here the germination is almost the same, but the difference in the number of normally germinated seeds between the treated and untreated seeds is 41 %.