

## 6-P.9

# Stimulating Action of Micro- and Nanodimensional Cavitation Bubbles on Germination of Seeds

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One of the physical factors that favorably influence the biological development of agricultural crops is an ultrasonic cavitation effect. Its application may become an innovative method that allows one to reach high yields in agriculture. In this communication the influence of ultrasonic cavitation treatment on the germination of seeds and early stages of growth of triticale (rye and wheat hybride) seedlings is studied. The samples of 50 seeds were treated by ultrasonic cavitation in water in the following regimes: the amplitude 20  $\mu\text{m}$ , frequency 17.6 kHz, temperature 25 °C, duration of treatment within 0, 2, 4, 6, and 8 min. Then the seeds were placed for germination and sprouting in Petri dishes on a wet filter paper at room temperature. It is shown that cavitation treatment at optimal regimes exerts a stimulating action on the germination of seeds and development of seedlings when the appropriate treatment regimes are chosen. The length of seedlings of the seeds treated by ultrasonic cavitation during 4 min is approximately by a factor of 1.5 greater than that of the untreated seeds. However, when the duration of cavitation treatment increases up to 6-8 min a considerable share of seedlings possess much lesser length; that is, a longer ultrasonic cavitation treatment inhibits the growth of seedlings. One of the peculiar features of the ultrasonic action is that the cavitation effect generates in the aqueous medium micro- and nanodimensional cavitation bubbles that produce microdamages on the seeds' coats and facilitates the water uptake by the seeds and their hydration. This, in turn, improves the conditions of germination of seeds. The cavitation treatment of seeds intensifies the mass exchange processes on the cell level. The obtained results give evidence that the method of cavitation pre-sowing treatment of seeds is promising for application.