

COMPARISON OF VARIOUS PRESOWING SEED TREATMENTS ON GERMINATION OF COTTON

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ABSTRACT

Soaking of cotton seeds prior to sowing and then rubbing in ash is a common practice to facilitate germination under adverse soil conditions. But little has been reported of the effects of various presowing soaking treatments on germination. This study therefore, evaluated the effects of various presowing seed treatments on germination of cotton. Treatments comprising of calcium sulphate, concentrated and dilute sulphuric acids were used in different quantities and durations. All presowing soaking treatments not only improved germination percentage but also accelerated the rate of germination. Soaking seeds (100g) for 10 minutes in reagent grade sulphuric acid gave better germination than control. Among the rates used, 20 ml concentrated acid 100g seed was the best dose for soaking seed. In another study, 50 ml acid used for soaking under various dilutions (1.8, 4.5, 9.0 and 13.5 mM sulphuric acid) gave best germination. Soaking of seeds for 30 minutes in this study was the optimum time except the case where seeds were soaked for 60 minutes in 4.5 mM acid. Of the various dilutions used for soaking seeds, 4.5 mM acid was good. Soaking seeds in gypsum solutions, stimulated germination and increased germination percentage more than any other chemical used. Maximum germination of 94% was obtained when seed soaking in 10 mM $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ was done for two hours.

Key words: Germination, Soaking, Acid treatment, cotton and gypsum

INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is a major staple crop of Pakistan, contributing Rs. 11697 million as foreign exchange to the national exchequer (GOP, 1989). Since the inception of Pakistan, it is the mainstay of the country. Unfortunately, per acre yield of cotton in the country is abysmally lower than many other cotton growing countries (FAO, 1990).

presence of proper moisture for seed imbibition is utmost important (Wahhab et al., 1959). Any delay in normal development of root and shoot extension at this stage will increase chances of seedling damage by edaphic or environmental factors (Ayers and Hayward, 1958). To improve germination in cotton, researchers used presowing techniques of seed treatment (Rauf and Mian, 1969; Marani and Amirav, 1970; Onkar et al., 1983). Marked increase in germination and seedlings vigor has been observed by delinting or soaking seed in water (Kurdikeri, 1979). Similar results on wheat and cotton have been reported by treating seed with calcium nitrate (Ikoeva, 1982), calcium chloride (Chaudhri and Web, 1968) and calcium sulphate (Lemaeva and Kallyeva, 1984). They attributed it to increased seedling vigor because of easy water absorption. Fowler (1979) found highest germination of seeds soaked in saturated gypsum solution as compared to those where only water imbibed or were untreated. Thomas and Christiansen (1971) found that soaking of cotton seeds in water or saturated calcium sulphate solution for 6 hours or in hot water for 1.5 minutes stimulated germination and seedling elongation in the laboratory, but advantage of soaking could not be demonstrated in the field even under favourable conditions.

Results contrary to the above work have been reported in several other studies where soaking was done in 10% potassium dihydrogen phosphate (Mehrotra et al., 1968) and in 0.2 to 0.5% sodium chloride solutions (Ikoeva, 1982). Since the information pertaining to soaking of seeds in sulphuric acid and calcium sulphate for different times and in different concentrations is lacking, the project was taken in hand to see the effect of soaking seeds in dilute sulphuric acid, concentrated sulphuric acid and calcium