International Journal of Agricultural Sciences
Volume 9 | Issue 1| January, 2013 | 392-412

A REVIEW

Seed hardening

K. SUJATHA*, K. SIVASUBRAMANIAM, J. PADMA AND K. SELVARANI
Department of Seed Science and Technology, Agricultural College and Research Institute,
MADURAI (T.N.) INDIA

Abstract : Pre sowing seed hardening with water and solutions of halide salts and growth regulating compounds to induce early germination, better root and seedling growth and increased yield has been employed by several workers. Seed hardening has been investigated by those concerned with problem of mitigating seed germination and seedling emergence under problematic field conditions. Hence, seed hardening is one of the physiological pre-sowing seed management practice given to seeds to resist drought or saline / sodic soils to boost up the yield and is also being practiced from time immemorial owing to the better performance among the agriculturists.

Key Words : Osmo hardening, Bio hardening, Chemical hardening, Seed quality characters

View Point Article : Sujatha, K., Sivasubramaniam, K., Padma, J. and Selvarani, K. (2013). Seed hardening. *Internat. J. agric. Sci.*, **9**(1): 392-412.

Article History : Received : 26.07.2012**; Accepted :** 17.11.2012

INTRODUCTION

In India, nearly 70 per cent of cultivated land is rainfed, but accounts for about 42 per cent of the total quantity of produced food grains. Quality seeds play a major role, along with improved package of practices leading to enhanced productivity. The low productivity under rainfed condition is due to use of poor quality seeds, soil moisture deficit, low and erratic rainfall and improper crop management. The most common impediment faced by an Indian farmer is the failure of monsoon, which in its extreme manifestation is called drought. In some of the regions, erratic rainfall leads to drought during the vegetative phase upsetting the water balance of a plant and as a consequence, the physiological functions contributing to growth and yield are deranged. Safe guarding seeds during initial stage of germination will give a special impetus for the seed to overcome the moisture stress condition and develop into a vigorous plant. Though this largely depends on genetic make up of the variety, pre-sowing treatments like hardening are also practiced to challenge the ill effects of drought on emergence and growth of the crop.

Seed hardening :

Henckel (1964) was the first to describe seed hardening as "a simple method to alter the physiological and biochemical nature of the seed in order to induce the factors responsible for drought resistance". Seed hardening technique has come a long way since Henkel's time and modified to suit various needs as determined by environment.

Different physiological activities within the seed occur at different moisture levels and the last physiological activity in the germination process is the emergence of radicle (Vertuci and Leopold, 1984; Taylor, 1997). The initiation of radicle emergence requires high seed water content (upto 30%). By limiting seed water content, all the metabolic steps necessary for germination can occur without the irreversible act of radicle emergence. Prior to radicle emergence, the seed is considered desiccation tolerant, thus the hardened seed moisture content can be reduced by drying. After drying, hardened seeds can be stored for a short time prior to sowing.

Pre-sowing hardening is one of the best methods that results in modifying the physiological and biochemical nature of seed so as to get the characters that are favourable for drought resistance. Pre-sowing hardening is the result of extensive physiological reorganization induced by dehydration process.

It can be done with water / dilute chemical solutions / growth regulating compounds or using commonly available natural tonics like coconut water or milk. Hardening induces early germination, better root and seedling growth, reduces

* Author for correspondence