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BRIEF COMMUNICATION

Seed Perpetuation in *Rhynchosia capitata* DC.

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Abstract. *Rhynchosia capitata* possesses a hard seed coat dormancy. Three types of seeds were marked out of this species on the basis of colour and mottling on the seed coat. The three different types behave differently when they were tested for germination.

Rhynchosia capitata is a common weed of the kharif crop. The plants appear through the seeds just after the rains and are annual prostrate twinner spreading all around the rootstock. About one month old plants start flowering and the seeds mature within three months when the plants also start drying.

The variability of seed size, weight and colour may be controlled by specific genetic constitution, the prevailing ecological conditions and also by internal competition for food during embryo development and seed maturation. WILLIAMS and HARPER (1965) have demonstrated that polymorphic seeds differ in their germination requirements. SEN (1968) reported eight different types of seed coat patterns in *Euphorbia caducifolia*, which showed different germination behaviour. Seven different seed coat colours and their varying imbibition and germination have been observed in *Indigofera tinctoria* by BHANDARI (1977). In the present study also three different polymorphic forms and their varying requirements for germination have been studied. Desert plants show a variety of ways in which seed coat or other coverings are currently understood to affect germination (CROCKER and BARTON 1957, SEN 1977). The effects are attributed chiefly to impermeability of the seed coat to water and oxygen, and to the mechanical strength of the seed coat which exerts sufficient restraint to the growth of the embryo. Impermeability of seeds to water has been reported in a number of plant species. This aspect of seed ecology has been considered important in weed ecology, because such seed coats allow water to leave but not to reenter the seed, and in various conditions and procedures that will make

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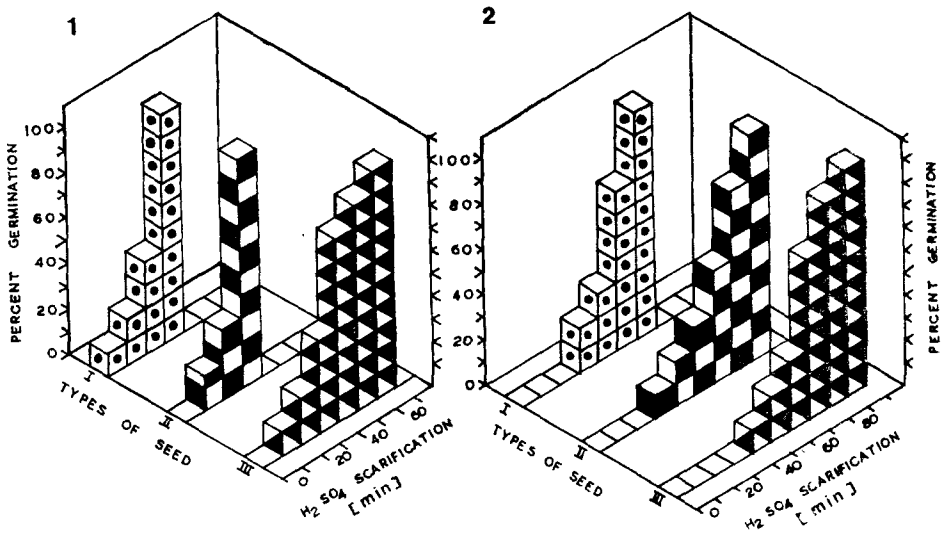

Figs. 1 and 2. Percentage germination in one year old (1) and one month old (2) seeds of *R. capitata* after conc. sulphuric acid scarification.

such seed coats permeable without reducing viability and the agricultural value of the seed (SEN 1977).

The seeds of *R. capitata* were collected from a bajra field in Mahamandir (near Jodhpur) and were stored in plastic bottles under laboratory conditions of light and temperature. The seeds of 1975 and 1976 collections were studied for their germination and were categorised into three different types according to the colour of the seed coat, viz. Type I — light brown seeds; Type II — dark brown-black seeds; and Type III — dark brown-black seeds with white mottling. The seeds of Type III appeared to be the most healthy.

Chemical scarification was done by keeping the seeds in concentrated sulphuric acid at 30 °C for different durations, ranging according to their types. At the end of treatment the seeds were washed thoroughly in running tap water for 2—3 h and then they were placed for germination. The temperature around seeds rises to 60 °C for 1 min only when H_2SO_4 is first washed with water.

Studies on seed germination were done in sterilized Petri dishes lined with a single layer of filter paper moistened with distilled water. The criterion of germination was visual detection of radicle protrusion. Each Petri dish contained 10 seeds and the sets were in triplicate. The experiments were carried out in continuous light of 1000 lx. The observations were recorded every 24 h for 7 to 10 days.

One year old seeds also showed hard seed coatedness and were given acid scarification. The observations are presented in Fig. 1. It is evident from Fig. 1. that although one year old seeds (1975 collection) of Type I and II required 30 min acid treatment for a hundred per cent germination, it appeared that Type II had a harder seed coat because it did not show any germination in control and showed lesser germination percentage on 10 and 20 min scarification. Type III had a still harder seed coat which required 60 min scarification for a hundred per cent germination.

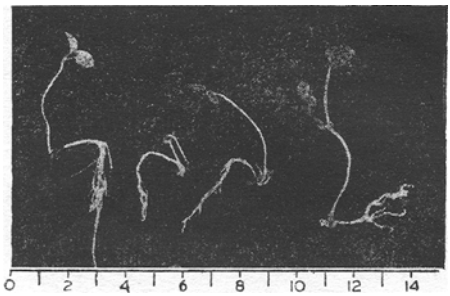

Fig. 3. Seedlings of *R. capitata* showing more than one shoot.

One month old seeds (1976 collection) of all the three types required much longer duration of acid pretreatment as compared to one year old seeds (Fig. 2). The seeds of Type I, II and III required 60, 80 and 90 min acid scarification, respectively, for 100 per cent germination within five days.

It was interesting to observe that the radicle normally protrudes out of the microphyle, but from the majority of seeds more than one shoot arose at a very early stage (Fig. 3). Their number varied from 1—4. These plumules grow further and bear leaves. This may be a specific feature of this plant since the branches spread on all sides from the central rootstock.

The most common and important cause of dormancy in the seeds of arid zone plants is a hard and impermeable seed coat which has been reported in *Rhynchosia minima* and *R. arenaria* (MULLICK and CHATTERJI 1972) and *R. minima*, *R. pulverulenta* and *R. schemperi* (BHANSALI and SINGHVI 1975). BOHRA and SEN (1974) have reported different colour patterns of the seed coat in *Crotalaria medicaginea* which differs in germination behaviour, too. A similar case of differential hard seed coat dormancy has been reported by SHARMA *et al.* (1978) in *Sesbania bispinosa* where four different types of seeds mature in different batches, but in the present study it has been observed that even the seeds produced on the same plant at the same time differed in their hard seed coatedness resulting in differential hard seed coat dormancy. Thus many of the seeds produced during a particular season may germinate in the coming one or two seasons, but others, with still harder seed coats, make a reserve of seeds for longer perpetuation.

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BOOK REVIEWS

GOMPERTS, B. D.: **The Plasma Membrane.** (Models for Structure and Function). — Academic Press, London—New York—San Francisco 1977. 224 pages, 95 figures, US $ 22.25, £ 11.40.

The study of membranes has recently become one of the most popular topics of biological research. A great number of data revealed by application of diverse techniques, such as X-ray diffraction, electron microscopy, nuclear magnetic resonance, electron paramagnetic resonance, calorimetry, fluorescent probes and various forms of optical spectroscopy to phospholipids, model (*i.e.* artificial) membranes and "simpler" or complex biological membranes, calls for a synthetic approach to their interpretation. The author is therefore to be congratulated on his successful attempt to write a synthetic description of the structural and functional properties of both artificial and biological membranes. The main aim of this book is to demonstrate that a study of simplified model membrane systems is relevant and meaningful approach to provide solutions to the problems of complex biological membranes.

The first chapter deals with model membranes — their preparation and thermal behaviour. The second chapter compares the results obtained by investigation of diverse biological membranes by means of electron microscopy (classical and freeze fracture) and X-ray diffraction methods. The red cell membrane was taken as an example of biological membrane. In the third chapter, there is a description and interpretation of some experiments in which biological and model membrane systems have been treated with permeability inducing substances such as valinomycin, gramicidin and others. Two specific examples illustrating the usefulness of model membrane systems in biological research — cell lysis mediated by antibody and complement and the triggering of the release of histamin from the cell — are presented in the last chapter.

The book is written authoritatively, logically and clearly. As a concise comprehensive review of the function and structure of the plasma membrane and model membrane systems may be recommended to everyone.

J. SLAVÍK (*Praha*)

KOROVIN, A. I., MAMAEV, E. V., MOKIEVSKIĬ, V. M.: **Osenne-vesennie usloviya pogody i urozhaĭ ozimykh. [Effect of Autumn and Spring Weather Conditions on Winter Crops Production.]** Gydrometeoizdat, Leningrad, 1977. 160 pp. Price 1.88 R.

This booklet, based above all on many years' investigations carried out by the authors in the Institute of Experimental Meteorology, summarizes the results of experimental research of autumn and spring weather condition effect on the production of winter wheat and rye. By means of modern technical instruments and equipments, weather conditions were modelled according to the natural weather type and its variations. Plants were then exposed to controlled thermal, moisture and feeding conditions. From the point of view of winter crop production, an analysis was made of the effect of highest and lowest temperatures during this period, of the first frost in autumn and the last in spring, of the period of lowest temperatures in winter and its length and of the snow cover, soil moisture and nitrogen feeding conditions.

The book is illustrated with 62 tables and 37 figures and photographs; the list of references contains 253 titles predominantly of Soviet authors. Unfortunately the English summary of the book is too brief. This book may be recommended to agronomists, agrometeorologists, botanists, ecologists and plant physiologists.

JARMILA SOLÁROVÁ (*Praha*)