

BRIEF COMMUNICATION

Chalazal Germination in *Trichodesma amplexicaule* ROTH.

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Abstract. Seed germination studies on *Trichodesma amplexicaule* were carried out. Seeds show abnormal behaviour of germination which is termed "Chalazal germination". This abnormal behaviour of germination is due to the presence of an obturator at the micropylar end. Seeds showed maximum (60 per cent) germination with 110 min concentrated H_2SO_4 treatment.

In general, germination is defined as the emergence of a radicle from the micropylar end of the seed. Germination from the chalazal end, in which the cotyledons are pushed out of the seed coat before the radicle, is uncommon and has been reported only in *Calotropis procera* (SEN and CHATTERJI 1965) and *Oropetium thomaeum* (DAKSHINI and TANDON 1970). In members of some families like *Bromeliaceae*, *Chenopodiaceae*, *Commelinaceae*, *Lythraceae*, *Myrtaceae*, *Onagraceae* and *Typhaceae*, cases in which the plumule is the first to emerge out of the seed coat have also been reported (LANG 1965). Chalazal germination is reported here for *Trichodesma amplexicaule* ROTH., a member of the *Boraginaceae* family. Chalazal germination in this species may be due to a peculiar situation with regard to seed coat structure.

T. amplexicaule occurs as a weed in the fields of Bajra and Til. Fruit is ellipsoidal and is a four-ridged schizocarp. It breaks up into four nutlets which are about 5—6 mm long and are ovoid and smooth. The nutlets are polished on the back and rugose on the inner face. It is difficult to collect the seeds of this species on the plant itself because as soon as the seeds become mature, they get detached from the fruit and get buried in the soil. The dispersal occurs mainly by ants. A fully mature dry seed exhibits a hard seed coat. The flowering and fruiting in this plant was noticed throughout the year but more profusely after rains. The seeds collected in March were lighter in weight as compared to those of September—October. The former possessed a rudimentary embryo.

The seeds for the present study were collected in September—October 1975. After six months of storage, seeds which exhibit hard seed coat dor-

TABLE I
Effect of concentrated H_2SO_4 pre-treatment on germination percentage of *T. amplexiculus*

Duration of pre-treatment [min]	Germination percentage after days							
	Continuous light				Total darkness			
	1	2	3	4	1	2	3	4
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100	16.7 $\pm$ 4.7	16.7 $\pm$ 4.7	23.3 $\pm$ 4.7	23.3 $\pm$ 4.7	16.7 $\pm$ 4.7	16.7 $\pm$ 4.7	16.7 $\pm$ 4.7	16.7 $\pm$ 4.7
110	60.0 $\pm$ 12.3	60.0 $\pm$ 12.3	60.0 $\pm$ 12.3	60.0 $\pm$ 12.3	50.0 $\pm$ 14.1	50.0 $\pm$ 14.1	56.7 $\pm$ 12.4	56.7 $\pm$ 12.4
120	60.0 $\pm$ 16.3	60.0 $\pm$ 16.3	60.0 $\pm$ 16.3	60.0 $\pm$ 16.3	30.0 $\pm$ 14.5	30.0 $\pm$ 14.5	36.7 $\pm$ 17.0	49.0 $\pm$ 14.1
130	56.7 $\pm$ 18.8	56.7 $\pm$ 18.8	56.7 $\pm$ 18.8	56.7 $\pm$ 18.8	26.7 $\pm$ 4.7	30.0 $\pm$ 0.0	30.0 $\pm$ 0.0	36.7 $\pm$ 4.7
140	50.0 $\pm$ 8.1	50.0 $\pm$ 8.1	50.0 $\pm$ 8.1	50.0 $\pm$ 8.1	33.3 $\pm$ 12.4	36.7 $\pm$ 12.4	36.7 $\pm$ 12.4	36.7 $\pm$ 12.4
150	46.7 $\pm$ 12.4	46.7 $\pm$ 12.4	46.7 $\pm$ 12.4	46.7 $\pm$ 12.4	26.7 $\pm$ 9.4	26.7 $\pm$ 9.4	26.7 $\pm$ 9.4	26.7 $\pm$ 9.4
160	33.3 $\pm$ 12.4	33.3 $\pm$ 12.4	33.3 $\pm$ 12.4	33.3 $\pm$ 12.4	20.0 $\pm$ 0.0	23.3 $\pm$ 4.7	23.3 $\pm$ 4.7	23.3 $\pm$ 4.7

mancy were treated with concentrated H_2SO_4 for 90–160 min. After that they were thoroughly washed in running water for four hours and kept for germination. Germination was carried out in continuous light and in total darkness at $25 \pm 2^\circ C$. Germination percentage was noted each day. Seeds pre-treated with concentrated H_2SO_4 for 110 min showed 60% germination in continuous light which was maximum (Table 1). There was absolutely no germination up to 90 min treatment. Treatments beyond 110 min resulted in lesser germination which may be due to injury to the embryo. Germination was slightly inhibited in the dark. Germination took place through the chalazal end (Fig. 1). However 1% micropylar germination was also observed.



Fig. 1. Successional stages of an abnormal germination process through chalazal end in *T. amplexicaule*.

It is also evident from Table 1 that germination took place within the first 24 h after setting the experiment.

The seed was completely filled with the well developed embryo. When the seed was dissected, the radicle appears as growing but it could not emerge due to the hard seed coat. Decoated seeds show almost 100 per cent germination. Abnormal chalazal germination as compared to normal micropylar, is attributed to the presence of an obturator at the micropylar end (KHANNA 1964). The present study does not support the work of SHANKER (1968) who observed 96 per cent germination after 35 min of concentrated H_2SO_4 treatment.

In nature, as seen in the experimental plots, the seeds germinate through the micropylar end. The seedlings appearing in nature are much fewer as compared to the number of seeds produced every year. This is due to the fact that most of the embryos of the seeds are eaten by ants.

The results suggest that in tropical weeds higher environmental temperature is a key factor in erasing the seed coat dormancy. Moreover the seeds have to face the desiccation effect of the soil for the whole year after their dispersal from the parent. Chalazal germination is an adaptation for easy germination when the seed coat is very hard and the radicle cannot emerge through the micropyle.

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BOOK REVIEW

GERLACH, D.: *Botanische Mikrotechnik. Eine Einführung*. 2., überarbeitete und erweiterte Auflage. — Georg Thieme Verlag Stuttgart 1977. XII, 311 S. 45 Abb. 24,80 DM.

Das Taschenbuch der botanischen Mikrotechnik erscheint nach acht Jahren in seiner zweiten, überarbeiteten Auflage. Es wurde in allen seinen Teilen durch neue, gründlich erprobte Methoden ergänzt. Die Abhandlungen über lichtmikroskopische Spezialverfahren konnten gekürzt werden, da ein Taschenbuch über das Lichtmikroskop in dieser Reihe herausgegeben wurde.

Vorliegende Einführung in die botanische Mikrotechnik ist in zwei Teile gegliedert. Im allgemeinen Teil werden zuerst die Zubereitung von Frischpräparaten, ihre Aufhellung und Kontrastierung behandelt. Es folgen die Verfahren zur Verarbeitung von fixiertem Pflanzenmaterial (Färbung, Schnitt- und Färbemethoden, Einschlussmittel). Die Verarbeitung von sehr kleinen Objekten, Mazerations- und Abdruckmethoden, die Herstellung von Präparaten für Fluoreszenz- und Polarisationsmikroskopie und die Herstellung von Semidünnschnitten werden anschließend behandelt. Der spezielle Teil des Taschenbuches beschäftigt sich mit den empfohlenen Untersuchungsmethoden für einzelne Gruppen des Pflanzensystems wie Bakterien, Blaualgen, Flagellaten, Rot-, Braun- und Grünalgen, Diatomeen, Pilze, Flechten und Kormophyten und der Anfertigung der entsprechenden Lebend- oder Dauerpräparate, der Schnitt- oder Totalpräparate. In einem Anhang enthält diese Ausgabe des Buches eine Übersicht der wichtigsten Präparationsverfahren in Stichwortform, die besonders weniger trainierten Lesern die Orientierung in der Reihenfolge der Operationen erleichtern soll. Das Buch schließt mit einem in thematische Kapitel gegliederten Literaturverzeichnis, einem Verzeichnis der Anschriften der im Text genannten Firmen und einem Sachverzeichnis. Das Buch enthält 46 schwarzweisse Zeichnungen und Abbildungen, der Text ist sehr übersichtlich durch Überschriften, Nummerierung und Absätze gegliedert. Solide Ausstattung, ansprechendes Taschenbuchformat und flexibler Kunststoffeinband kennzeichnen das Äußere des Bandes.

Vorliegende Einführung in die botanische Mikrotechnik ist in erster Linie solchen Lesern bestimmt, die noch wenig Erfahrungen auf diesem Gebiet haben und will ihnen ohne viel Theorie nützliche Anleitungen darbieten. Es werden solche Methoden bevorzugt, die sich für möglichst viel Pflanzenmaterial anwenden lassen und die jedoch andererseits dem heutigen Stand der Methoden entsprechen. Als besonderes Vorteil des Buches möchte ich die Tatsache unterstreichen, dass der Verfasser alle beschriebenen und empfohlenen Methoden selbst gründlich ausprobiert hat und so wirklich die empfehlen konnte, die bei geringstem Material- und Zeitaufwand sichere Ergebnisse liefern.

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