

Evenari M. Germination inhibitors. *Bot. Rev.* 15:153-94, 1949.  
[Hebrew University, Jerusalem, Israel]

Ontogeny is not a continuous process of development but alternates with periods during which development is completely or partially inhibited. A list is given of plants known to contain germination inhibitors in their coats, pulp, or juice. The probable physiological action of the inhibitors is discussed as well as the relationship between inhibitors and auxins, light, permeability, respiration, enzyme activity, and all the possible biological functions of germination inhibitors. [The *SCI*® indicates that this paper has been cited in over 170 publications since 1955.]

Michael Evenari  
Department of Botany  
Beth Berman  
Hebrew University  
Jerusalem 91904  
Israel

August 31, 1986

My interest in the mysteries of seed germination started when I was 13 years old.<sup>1</sup> When I emigrated in 1933 from Germany to Palestine as a member of the plant physiology section of the Hebrew University in Jerusalem, I decided that in this new and then undeveloped country, it was the duty of a scientist to do something practical that would help to improve the conditions, in my case, of agriculture. The opportunity to do so came soon. One day, I was visited by David Zirkon, a member of Kibbutz Ain Kharod. He had some problems with the germination of some valuable cultivars of apple seeds. Could I as a plant physiologist help him? And thus began my and my students' work on germination inhibitors. We published a number of papers on germination inhibitors in the *Palestine Journal of Botany, Jerusalem Series*. I still have a PhD thesis by S.B. Ullman<sup>2</sup> that would even today be of interest, but which I cannot publish because the author disappeared after having received his degree.

Certain things soon became clear to me. It turned out that we were certainly not the first

to deal with germination-inhibiting substances. Albertus Magnus (1093-1280) already knew of them.<sup>3</sup>

Second, germination inhibitors are in no way a specialty of cultivated plant seeds, like apples, sugar beets, or tomatoes, but are present in many wild plants like *Sinapis alba*, *Poterium spinosum* (our modern taxonomists now baptize it *Sarcopoterium*), *Zygophyllum dumosum*, and *Trigonella arabica*. It became obvious to us that germination inhibitors played an important part in the ecological behaviour of plants, for example, by preventing the seeds from germinating inside their fruits.

Third, germination inhibitors are only a part of a much larger field of plant physiology and ecology that Hans Molisch called, in his most original and brilliant book,<sup>4</sup> allelopathy, i.e., the influence of one plant on another.

In 1948 I was lucky enough to be invited to the California Institute of Technology for my sabbatical. When I spoke to James Bonner, who together with Frits Went was my guide and mentor there, about our work on germination inhibitors, he simply said to me: "Why don't you write a review on this matter?" I did, and the paper was published in 1949 in the *Botanical Review*.

The reason why this paper is cited even today is, I think, the fact that ecologists recognize more and more the importance of germination inhibition and allelopathy in understanding the survival of plants, especially under difficult conditions like those of the desert.

In the meantime, modern reviews of our theme have been published in various books.<sup>5-7</sup>

I am only sorry that even now not much is known about the physiological action of germination inhibitors. What part in the long chain of the germination process do they inhibit? How and when are they activated? What is their molecular action? Here, a large field is open for further research.

1. Evenari M. A cat has nine lives. *Annu. Rev. Plant Physiol.* 36:1-25, 1985.
2. Ullman S B. *Essential oils, alkaloids and glucosides as inhibitors of germination and growth*. PhD thesis, Hebrew University, Jerusalem, 1940.
3. Koeckermann A. Albert der Grosse, der Entdecker der Keimungshemmenden Wirkung des Fleisches saftiger Fruechte. *Z. Gesamte Naturwissen.* 2:366-7, 1936.
4. Molisch H. *Der Einfluss Einer Pflanze Auf Die Andere. Allelopathie*. Jena: Fischer, 1937. 106 p.
5. Wareing P F. Endogenous inhibitors in seed germination and dormancy. *Encyclopedia of plant physiology*. Berlin: Springer-Verlag, 1965. Vol. XV/2. p. 909-24.
6. Mayer A M & Poljakoff-Mayber A. *The germination of seeds*. Oxford: Pergamon Press, 1982. 211 p.
7. Bewley J D & Black M. *Physiology and biochemistry of seeds in relation to germination*. Berlin: Springer-Verlag, 1982. Vol. 2.