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Specialised Features of the Red Speckle Bean, *Phaseolus Vulgaris*

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ABSTRACT

Phaseolus vulgaris is known as the common bean. This species is common in Africa and Asian countries, since it's easy to grow. One of the specialised features of this bean is that it is grown in moist and well-aerated soils, as well as the fact that these seeds can easily be dispersed and germinated. A lot of research has been performed in *Phaseolus vulgaris*, and very little is not known about plant belonging to this genus. Classroom experiments in *Phaseolus vulgaris* are thus trustworthy and are well-discussed examples of the earlier work performed on the red speckle bean. This paper emphasises on the specialised features prevalent in beans of *Phaseolus vulgaris*.

KEYWORDS: Zea mays, dicots, water acquisition, seed coat, calcium, spermatophyte, elements, dormancy, dispersal, embryo, phaseolin

Phaseolus vulgaris, also known as the common bean plant, is native to South Africa (Singh, 2019). It is often found growing in ordinary, well-aerated soils, with moderate humus content. The beans of *Phaseolus vulgaris* have specialised features just like other bean varieties. One specialised function of the red speckle bean is that it is found as a food source in many Asian and African countries. Just like the seeds of mealies, *Zea mays* also has this function. Apart from this not much is different between those two seed types, since their internal morphological features are more or less the same, with an exception of the cotyledons and during germination, when sporophyte production is initiated in dicotyledons (Singh, 2019). The red speckle bean is a dicot plant, which means that the seeds germinate to give rise to two primary leaves first. The specialised feature is said to be significant because it is the first accessible point for sunlight into the plant. This means that light as well as dark respiration is able to be initiated by the exposure of these two leaves to sunlight (Singh, 2019). Although *Zea mays* is a common comparative with the red speckle bean, the beans of all dicotyledons are highly specialised. One of the remarkable features of *Phaseolus vulgaris* lies in the first point of water acquisition, the seed coat. This is unique in the red speckle bean since the seed coat protects the seed from mechanical and physical abrasion imposed by the soil. It also serves to protect the seeds from bacterium housed within the soil, such as nitrifying and denitrifying bacteria (Singh, 2019). Unsurprizingly, the seed coat is the layer in the seed which contains the most amount of calcium in comparison to any other regions of the seeds. Over 90 % of the calcium is found in a crystalline form in the seed coat. Therefore, this region is strong enough to protect the seed. Other specialised features of *Phaseolus vulgaris* is the fact that the inner-region of the seed contains several minerals, and, as a result, it is often said that the red speckle bean is a rich source of vitamins (Petry et al., 2015). These minerals include phosphorous and magnesium, which play a significant role in oxidative phosphorylation in mammals. These nutrients probably contribute toward development of the spermatophyte in germinating dicots, since these are elements required for plant tissue development, and maturation (Nwokolo, 1996). Surprisingly, though, the most amounts of proteins are found within the seed, perhaps, so, because of tissue maturation processes with the seeds of *Phaseolus vulgaris*. Another specialised feature of these seeds is their kidney shape. This shape enables water to be housed within the seed, allowing for plant embryos to be produced (Nwokolo, 1996, Singh, 2019). The processes of embryogenesis in *Phaseolus vulgaris* is a model example in dicotyledon germination

experiments, since the seeds are easier types to grow (read Singh, 2001). This means that it is pivotal to understand the process of spermatophyte maturation in this plant, since zygote formation requires nutrient rich endosperm tissues. Thus, the latter, is also a specialised feature of these seeds. The formation of the epicotyl and hypocotyl are also significant features of these seeds, like in all other seeds (Nwokolo, 1996). In *Phaseolus vulgaris*, when the endosperm gets saturated with water, elements from the endosperm initiates embryo propagation, which gives rise to embryonic plants (Delgado-Salinas *et al*., 2006). An interesting feature of the red speckle bean is that water doesn't have to break through the seed coat to initiate germination, since removal of the seed coat won't affect the nutrient content of the endosperm, but could add to its content if intact (Singh, 2001). The seed coat in *Phaseolus vulgaris* retains moisture in well saturated soils, but also aids in dormancy and seed dispersal mechanisms. This is a significant feature which will enable the genesis of Phaseolus to survive. The phaseolin protein found in *Phaseolus vulgaris* is an important seed-binding protein in tobacco plants (Gepts *et al*., 1986). This specialised feature is discussed in a report by the author.

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