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Seed Coat Colour Variation and its Impact on Seed Quality Parameters of Horsegram var. Paiyur 2

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ABSTRACT

Background: Seed coat colour is an indicator of seed maturation and it attain specific colour at physiological maturity. The seed coat is a main modulator of interactions between the internal structures of the seed and the external environment not only preserves integrity of the seed parts but also protects the embryo from mechanical injuries and attack of pest and diseases. The seed coat colour is an important factor in determining the seed quality. For this purpose a study was conducted in the department of Seed Science and Technology, Agricultural College and Research Institute, Madurai during 2020.

Methods: To identify the seed coat colour variation and its impact on seed quality in horse gram var. Paiyur 2. The seeds of paiyur 2 were visually grouped in to dark brown, light brown and cream based on colour and were evaluated for the seed quality parameters

Result: The results indicated that light brown seed coat colour recorded its superiority in all the seed quality parameters.

Key words: Cream, Dark brown, Light brown, Seed coat colour, Seed quality parameters.

INTRODUCTION

Horsegram [*Macrotylomauniflorum* (Lam) Verdc.] belonging to the family Fabaceae is known as a poor man's pulse and is distributed mainly in Deccan plateau and plains and coastal areas in southern India rarely extend to central India. It is a traditional hardy annual tropical grain legume adapted to dry situations and naturally found in rain shadow areas of Western Ghats as an important component in natural grasslands and in rocky crevices in mountain slopes at lower elevations. Besides its excellent nutritional value, it also grown as cover crop to maintain the soil fertility and to reduce the soil erosion. It is a multi-utility crop used as human food, feed, fodder and green manure. It forms the cheap source of vegetable protein, vitamins, calcium and iron and owing to its diuretic property it is good for patients suffering from urinary and kidney problems (latha *et al*., 2013). Due to wider adaptability, it is grown under various climatic conditions in various places of India. Peninsular Indian region and Africa are said to be the centers of origin for horse gram. In India, it is cultivated in 4.61 lakh ha with productivity of 1000 kg/ha in Telangana followed by Uttarkhand with a productivity of 923 kg/ha. In Tamil Nadu, horse gram is cultivated in 0.8 lakh ha with productivity of 691 kg/ha (Indiastat, 2019). Seed colour is a simple and excellent indicator of seed quality. Association of seed colour with seed quality was reported by Srimathi and Malarkodi, 2002 in rice bean; Anuradha *et al*., 2009 in bengal gram; Latha *et al.,* 2013 in horse gram and Tiryaki *et al.,* 2016 in common vetch. Seed colour influences water uptake (Powell *et al*., 1989), gas diffusion indicator of seed maturation, seed dormancy (Baskin *et al*., 2000), germination and seedling emergence (Mavi, 2010) in some crop plants, owing to colour pigments located in the seed coat (Powell *et al*., 1989; Abdullah *et al*., 1991). Considering the importance of seed coat colour in various crops, studies were carried out to identify the effect of seed coat colour on seed quality in horse gram var. Paiyur 2.

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MATERIALS AND METHODS

The laboratory studies were carried out in the Department of Seed Science and Technology, Agricultural College and Research Institute, Madurai, Tamil Nadu, India. The fresh seeds of horsegram var. Paiyur 2 were collected from Regional Research Station, TNAU, Paiyur. Graded seeds of Horse gram were grouped into three color groupings, on visual observation as dark brown, light brown and cream (Fig 1). The following seed quality characters were recorded *viz*., germination (Percentage) (ISTA,1999), root length (centimeter), shoot length (centimeter), dry matter production (g seedlings^{-10}) and vigour index (Abdul Baki and Anderson,1973). The data were analysed for significance as per Panse and Suchatme (1999).

RESULTS AND DISCUSSION

The results of the study showed a significant variation was due to the seed coat colour among all the seed. The vigour parameters like root length (18.8 cm), shoot length (8.85 cm), dry matter production (0.195 g seedlings^{-10}) and vigour index (2544) value alsomore in light brown colored seeds followed by cream colour seeds (Fig 2). Poor seed quality parameters of dark brown seeds might be due to the ageing process. The germination potential was high in light brown colour seeds (92%) followed by cream and brown seeds (80%) (Fig 3). Similar results were also reported in bengal gram (Anuradha *et al*., 2009), in horse gram (Latha *et al*., 2013) and ricebean (Srimathi and Malarkodi, 2002). The pigmentation of the seed coat colour was mainly determined by flavonoids and anthocyanins (Dixon and Summer, 2003), polyphenols in Bengal gram (Anuradha *et al*, 2009) and in rice bean (Srimathi and Malakodi, 2002). However, the seed coat colouris also influenced by environmental stimuli (Sneda *et al*., 2004) and environment can promote nongenetic maternal changes in the seed coat thickness and composition (Lacey *et al*.,1997). Earlier studies indicated that the seed coat colour was polygenic, controlled by several genes in various plant species including legumes such as cowpea(Egbadzor*et al*., 2014), in bean (Possobom *et al*., 2015), in soybean (Yang *et al*., 2010) and in common vetch (Gulgunyildiz *et al*., 2016). It is concluded that light brown seed coat colour could be the preferred colour for future yield improvement programme.

Fig1: Seed coat colour variations in horse gram var. Paiyur 2.

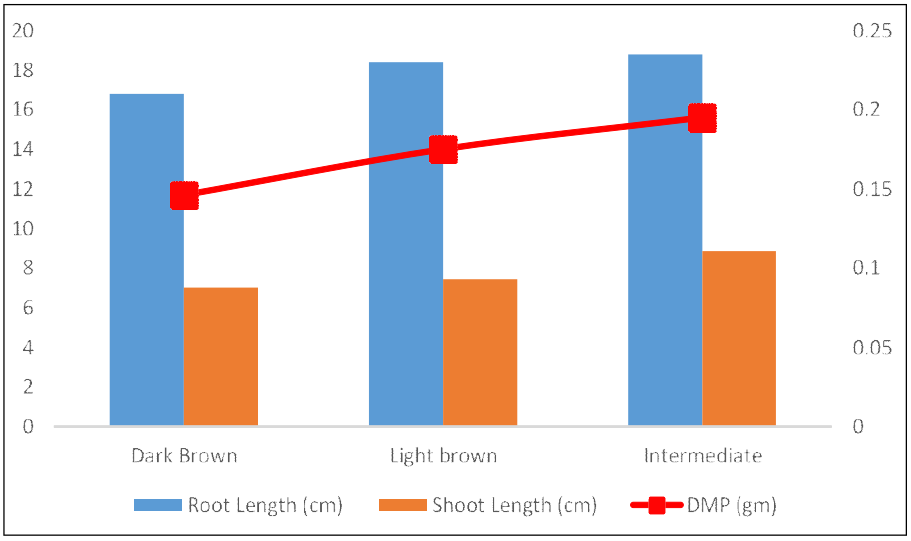

Fig 2: Seed coat colour variation and its impact on root length (cm) shoot length (cm) and dry matter production (g seedlings^{-10}).

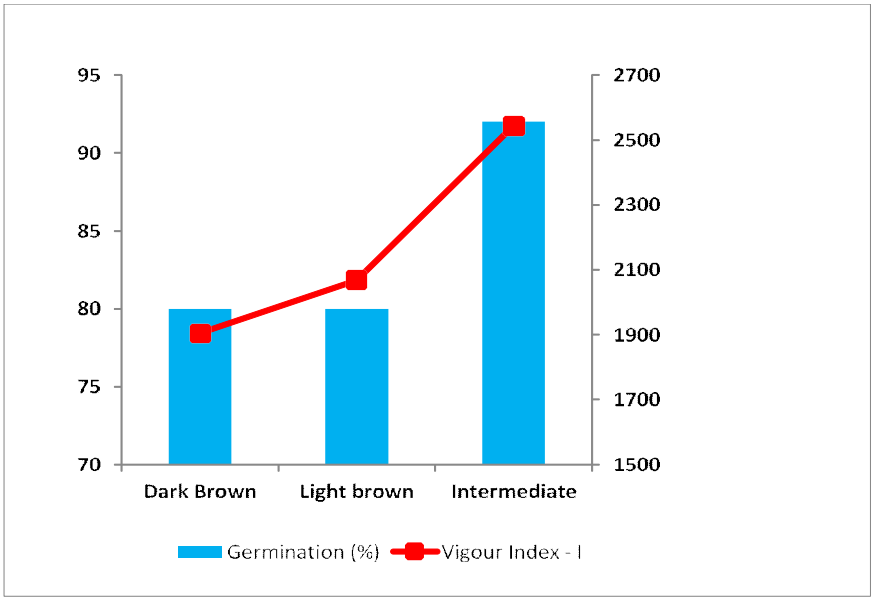

Fig 3: Seed coat colour variation and its impact on germination (%) and vigour index.

CONCLUSION

It was concluded that seed coat color is an indicator of seed vigor in horse gram cultivars and the darker seeds produced a delayed germination and restricted seedling growth. Light brown seed coat color may be beneficial for improving seeds quality for their high seed vigor and seedling growth ability and also light brown seed coat colour could be the preferred colour for future yield improvement programme.

Conflict of interest: None.

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