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# Assessment of status of seed dormancy in traditional rice varieties

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**Abstract**
A study was conducted to assess the status of seed dormancy and its duration in 16 traditional rice varieties by evaluating the germination and viability per cent at five days interval from harvest to the attainment of maximum standards. The results showed that the freshly harvested seeds in 14 traditional rice varieties showed dormancy and it reduced naturally over a period of time during storage. The varieties *viz*., Chinnar, Kandasaali and Sorna have expressed strong dormancy of more than 30 days in comparison to other varieties. Whereas, the varieties *viz*., Poovan samba and Varigarudan samba have recorded with no dormancy in seeds.

**Keywords:** Traditional rice, dormancy, duration of dormancy

## Introduction
Rice (*Oryza sativa* L.) is an important and most widely consumed staple food crop of the world, especially in Asia and Africa. In India, rice is grown in an area of 43.66 million ha, yielding 188.37 million tonnes with a productivity of 2,722 kg/ha. While in Tamil Nadu, 1.90 million ha area with a production of 7.71 million tonnes and productivity of 3,760 kg/ha have been recorded (Indiastat, 2020). Rice is rich in carbohydrate (90%), protein (7.1 to 8.3 g), fat (1.6 to 2.8 g), iron (0.2 to 5.2 mg) and zinc (0.6 to 2.8 mg) (FAO, 1993) [5].

Nowadays, the traditional varieties or landraces are gaining momentum due to their nutritive and medicinal properties. A 'landrace' is a domesticated, regionally adapted plant variety that evolved through adaptation to its natural environment. Landrace seeds have not been systematically selected and marketed by seed corporations, nor have plant breeders developed them. Therefore, the term "landraces" refers to all regional cultigens that differ from each other but share enough characteristics to be classified as a group. Many Asian countries consider coloured rice to be a functional food due to the numerous health benefits associated with anthocyanins (Kim *et al.*, 2008) [9]. These varieties have higher amount of glutamic acid, vitamins, fibre and bioactive components such as polyphenols, tocopherols, oryzanol, tocotrienols and flavonoids which help to prevent chronic diseases (Caius, 1999) [4]. These rice landraces are also rich in vitamin $B_1$, iron and zinc and they aid in cholesterol reduction (Verma and Shukla, 2011) [16].

Traditional varieties possess characteristics that allow them to potentially adapt to a wide range of biotic and abiotic stresses. This vast reservoir of rice germplasm is an excellent source of key alleles for developing new rice varieties. Because they contain important traits required for improving and developing new rice varieties and these germplasms are the foundation of any rice breeding programme.

Seed dormancy in wild species was discovered to be a primitive trait of rice (Takahashi, 1984) [14] that was lost during domestication (Veasey *et al.*, 2004) [15]. The inability of a viable seed to germinate for a certain period of time even under ideal conditions is known as seed dormancy (Bewley, 1997) [3]. This is an adaptive trait that helps many plants survive in nature (Simpson, 1990) [13]. Dormancy is a type of developmental arrest and a mechanism by which seeds maintain viability in adverse conditions. Further, pre-harvest sprouting (PHS) is one of the limiting factors for rice production in humid climates. Thus, seed dormancy is an important trait in cereal crop breeding programmes, because of its association with resistance to pre-harvest sprouting. Environmental factors such as high temperatures during the later stages of ripening period have a significant impact on seed dormancy. It can be imposed in two ways, either by seed coverings (e.g. pericarp, testa and in some cases, endosperm) or by the embryo itself (Bewley and Black, 1994) [2].

Despite this advantage, dormancy causes problems for seed analysts and seed producers, especially when the germination percentage of a seed lot must be determined within a short period of harvesting. Farmers who begin seed or crop production immediately after harvest can benefit greatly from understanding the duration of seed dormancy. Also, this will aid scientists in developing cost effective dormancy breaking methods. Therefore, it is crucial to understand the dormancy and its persistence in the rice seeds and thus, the present study was aimed.

## Materials and Methods

The rice crop with 16 traditional varieties *viz*., Arasamba, Chinnar, Kaalabadh, Kandasaali, Korangu samba, Kudhiraivaali samba, Manjal ponni, Naatu basmati, Nalan namak, Poovan samba, Sivan samba, Sorna, Thanga samba, Thengaipoo samba, Varigarudan samba and Vellaigundu samba was raised at Wetlands Farms, Tamil Nadu Agricultural University (TNAU), Coimbatore during 2021-22 for seed multiplication and laboratory experimentation. Then, the freshly harvested seeds were collected from the field for the studies and the experiments were carried out in the Department of Seed Science and Technology, TNAU, Coimbatore. The seeds were cleaned thoroughly and stored at ambient condition. Then, the germination test was carried out regularly at five days interval starting from the date of harvest until the reach of required minimum germination percentage as prescribed by the Indian Minimum Seed Certification Standards (IMSCS). Simultaneously, the viability of the seeds was also assessed by tetrazolium test.

Four replicates of 100 seeds each were taken at random from each variety and placed in a paper medium using between paper method and allowed to germinate in a germination room maintained at 25± 2 °C and 90 per cent relative humidity and illuminated with fluorescent light. After 14 days, the seedlings were evaluated and the number of normal seedlings produced was counted. The germination was calculated and expressed in percentage (ISTA, 2015).

$$\text{Seed germination (\%)} = \frac{\text{Number of normal seedlings}}{\text{Total number of seeds sown}} \times 100$$

During evaluation of germination test, the seeds that did not produce seedlings but remains fresh at the end of the test period were classified as fresh ungerminated seeds (FUG) and the percentage was calculated.

In addition to that, the viability of seeds was determined at five days interval from immediately after harvest using the tetrazolium test (ISTA, 2015). During which, four replications comprising of 100 seeds each in all the varieties were conditioned overnight in distilled water. Using forceps and needles, the hull was pealed by lifting up at the pointed end. The layer covering of the embryo portion was removed for easy identification of stains in pigmented rice varieties. The prepared seeds were placed in a small beaker containing one per cent aqueous solution of 2, 3, 5 - triphenyl tetrazolium chloride. The beakers were covered with aluminium foil and incubated at 40±1 °C in the dark for 2 h. Then, the seeds were evaluated as viable or dead based on the staining pattern in the embryo. The viability percentage was calculated using the following formula based on the red colouration.

$$\text{Viable seed \%} = \frac{\text{Number of fully stained seeds}}{\text{Total number of seeds placed}} \times 100$$

Based on the germination and tetrazolium viability tests, the level of dormancy and its period of existence were arrived by following the classification given by Hanumanthappa *et al.* (2015) [8]. The seeds of the varieties that showed dormancy for the period of upto 14 days have been categorized as weakly dormant and 14-30 days as medium dormant and more than 30 days as strongly dormant.

The data obtained from the experiment was analysed statistically by the 'F' test of significance following the methods given by Rangasamy (2002). The per cent values were transformed to angular (arc-sine) values wherever required before analysis. The critical differences (CD) were calculated at probability level of five per cent.

## Result and Discussion

The experimental results showed that the traditional rice varieties have recorded significant differences in their dormancy level and period. In which, the initial germination recorded was very minimum in Sorna (8 %), Kandasaali (14 %), Thengaipoo samba (16 %), Chinnar (24 %), Kaalabadh (28 %), Arasamba (28 %) and Sivan Samba (35 %) (Table 1). However, the varieties *viz*., Poovan samba and Varigarudan samba have recorded more than 80 per cent germination during initial evaluation itself which showed no dormancy in it. Therefore, the results showed that the germination percentage obtained immediately after harvest was minimum in most of the varieties and it increases naturally during storage at ambient condition (Figure 1). In which, the varieties *viz*., Kudhiraivaali samba and Naatu basmati have showed weak dormancy and Arasamba, Kaalabadh, Korangu samba, Manjal ponni, Nalan namak, Sivan samba, Thanga samba, Thengaipoo samba, Varigarudan samba and Vellaigundu samba varieties were recorded with medium dormancy. However, Sorna and Kandasaali have showed strong dormancy period (Table 1).

Similar results of seed dormancy in traditional rice varieties *viz*., Kuruvai kalangium, Kothamalli samba, Nootripathu, Kallundrikar, Karunkuruvai, Anaikomban, Channangi, Senthooram selection, Thengaipoo samba, Arasamba, Panamara samba selection, Sembarai and Sarapillai samba selection were recorded with more than 30 days (Raja *et al*., 2021) [10]. Hanumanthappa *et al.* (2015) [8] reported that the rice genotypes such as NES-07-03-01, IET-19251, JGL-1798, IET-19828 and IR 64 with a dormancy period for two, three, four and five weeks, respectively. Mostly, the red rice had dormancy period for 45 days after harvesting, which was released later by giving after-ripening period (Gianinetti and Cohn, 2008) [6].

Also, rice varieties have showed significant differences in the level of dormancy when harvested at different stages of harvest (Roberts, 1961) [11]. Likewise, the present study showed that the maximum fresh ungerminated seeds were recorded in Sorna (90%) followed by Kandasaali (84%) during initial evaluation (Table 2). Whereas, the minimum fresh ungerminated seeds were recorded in Poovan samba (12%) followed by Varigarudan samba (20%) wherein the seeds readily germinated immediately after harvest. Also, there was a reduction in the percentage of fresh ungerminated seeds with the increase in the storage period. This might be due to the release of the dormancy in the seeds. The variation in dormancy period of rice seeds among the varieties was stated earlier by many workers (Agrawal, 1981; Seshu and Dadlani, 1991) [1, 12]. The variation between varieties and days after harvest for the presence of fresh ungerminated seeds is

significant. Also, Gupta *et al.* (2001) [7] obtained similar results in which the seed dormancy duration was maximum in fresh seeds as compared to later days of harvest. The presence of fresh ungerminated seeds for a prolonged period of about 35-40 days was also observed in the varieties *viz*., Chinnar, Kandasaali and Sorna.

The viability of the seeds by tetrazolium chloride test was also carried out so as to confirm the dormancy status of the seed. The varieties *viz*., Kaalabadh, Korangu samba, Kudhiraivaali samba, Manjal ponni, Poovan samba, Sivan samba and Varigarudan samba showed the maximum viability (100%) (Table 3). Other varieties were also showed the viability percentage of above 95 per cent. Veasey *et al.* (2004) [15] also reported that viable seeds of *Oryza grandiglumis*, *O. latifolia* and *O. alta* had strong fresh seed dormancy, which was released 60 days after harvest. Therefore, it showed that the seeds of the 14 traditional varieties have dormancy and they need dormancy breaking seed treatment or minimum period of storage to release the dormancy. Further, these varieties can also be used as donor for transfer of traits during varietal development programme and to prevent pre-harvest sprouting or *in situ* germination of seeds in the field.

**Table 1:** Status of seed dormancy and germination in traditional rice varieties

| Varieties | Germination (%) | | | | | | | | | Dormancy period | Dormancy intensity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 DAH | 10 DAH | 15 DAH | 20 DAH | 25 DAH | 30 DAH | 35 DAH | 40 DAH | Mean | | |
| $V_1$ - Arasamba | 28 (31.95) | 36 (36.87) | 44 (41.55) | 62 (51.94) | 72 (58.05) | 88 (69.73) | 90 (71.56) | 90 (71.56) | 64 (53.13) | 14-30 days | M |
| $V_2$ - Chinnar | 24 (29.33) | 40 (39.23) | 45 (42.13) | 49 (44.42) | 55 (47.87) | 60 (50.76) | 77 (61.34) | 94 (75.82) | 56 (48.45) | > 30 days | S |
| $V_3$ - Kaalabadh | 28 (31.95) | 35 (36.27) | 47 (43.28) | 52 (46.14) | 76 (60.67) | 88 (69.73) | 94 (75.82) | 96 (78.46) | 65 (53.73) | 14-30 days | M |
| $V_4$ - Kandasaali | 14 (21.97) | 26 (30.66) | 28 (31.95) | 35 (36.27) | 54 (47.29) | 58 (49.60) | 80 (63.43) | 95 (77.08) | 49 (44.43) | > 30 days | S |
| $V_5$ - Korangu samba | 62 (51.94) | 70 (56.79) | 78 (62.02) | 87 (68.87) | 93 (74.66) | 97 (80.03) | 100 (89.72) | 100 (89.72) | 86 (68.03) | 14-30 days | M |
| $V_6$ - Kudhiraivaali samba | 76 (60.67) | 81 (64.16) | 86 (68.03) | 91 (72.54) | 96 (78.47) | 97 (80.03) | 98 (81.87) | 100 (89.72) | 91 (72.54) | <14 days | W |
| $V_7$ - Manjal ponni | 68 (55.55) | 74 (59.34) | 74 (59.34) | 89 (70.63) | 94 (75.82) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 87 (68.87) | 14-30 days | M |
| $V_8$ - Naatu basmati | 72 (58.05) | 76 (60.67) | 81 (64.16) | 86 (68.02) | 89 (70.63) | 92 (73.57) | 96 (78.47) | 98 (81.87) | 86 (68.03) | 14-30 days | W |
| $V_9$ - Nalan namak | 61 (51.36) | 65 (53.73) | 76 (60.67) | 89 (70.63) | 91 (72.54) | 94 (75.82) | 96 (78.47) | 99 (84.26) | 84 (66.42) | 14-30 days | M |
| $V_{10}$ - Poovan samba | 88 (69.73) | 92 (73.57) | 98 (81.87) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 97 (80.03) | Nil | ND |
| $V_{11}$ - Sivan samba | 35 (36.27) | 49 (44.43) | 63 (52.54) | 72 (58.05) | 77 (61.34) | 88 (68.73) | 96 (78.47) | 100 (89.72) | 73 (58.69) | 14-30 days | M |
| $V_{12}$ - Sorna | 8 (16.43) | 12 (20.27) | 17 (24.35) | 24 (29.33) | 33 (35.06) | 77 (61.34) | 87 (68.87) | 91 (72.54) | 44 (41.56) | > 30 days | S |
| $V_{13}$ - Thanga samba | 63 (52.54) | 65 (53.73) | 77 (61.34) | 87 (68.87) | 90 (71.57) | 94 (75.82) | 96 (78.47) | 96 (78.47) | 84 (66.42) | 14-30 days | M |
| $V_{14}$ - Thengaipoo samba | 16 (23.58) | 32 (34.45) | 48 (43.86) | 66 (54.33) | 80 (63.44) | 92 (73.57) | 97 (80.03) | 96 (78.47) | 66 (54.33) | 14-30 days | M |
| $V_{15}$ - Varigarudan samba | 80 (63.44) | 83 (65.65) | 90 (71.57) | 95 (77.08) | 98 (81.87) | 98 (81.87) | 100 (89.72) | 100 (89.72) | 93 (74.66) | Nil | ND |
| $V_{16}$ - Vellaigundu samba | 51 (45.57) | 53 (46.72) | 55 (47.87) | 61 (51.36) | 89 (70.63) | 92 (73.57) | 95 (77.08) | 96 (78.47) | 74 (59.34) | 14-30 days | M |
| Mean | 48 (43.86) | 56 (48.45) | 63 (52.54) | 72 (58.05) | 80 (63.44) | 88 (69.73) | 94 (75.82) | 97 (80.03) | 75 (60.00) | 14-30 days | M |
| | D | | | V | | | DxV | | | | |
| SEd | 0.52 | | | 0.74 | | | 2.09 | | | | |
| CD (P=0.05) | 1.03 | | | 1.45 | | | 4.11 | | | | |

(*DAH - days after harvest; W - weak; M - medium; S - strong; ND- non-dormant; V- varieties; D - days) (Values in parenthesis indicate arcsine transformed)

**Table 2:** Fresh ungerminated seeds in freshly harvested traditional rice varieties

| Varieties | Fresh ungerminated seeds (%) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 5 DAH | 10 DAH | 15 DAH | 20 DAH | 25 DAH | 30 DAH | 35 DAH | 40 DAH | Mean |
| $V_1$ - Arasamba | 63 (52.54) | 60 (50.77) | 50 (45.00) | 34 (35.67) | 20 (26.57) | 7 (15.34) | 6 (14.18) | 4 (11.54) | 31 (33.83) |
| $V_2$ - Chinnar | 74 (59.34) | 58 (49.60) | 54 (47.29) | 48 (43.85) | 43 (40.98) | 38 (38.05) | 20 (26.57) | 4 (11.54) | 42 (40.39) |
| $V_3$ - Kaalabadh | 72 (58.05) | 65 (53.73) | 53 (46.72) | 48 (43.86) | 24 (29.33) | 12 (20.27) | 5 (12.92) | 4 (11.54) | 35 (36.27) |
| $V_4$ - Kandasaali | 84 (66.42) | 72 (58.05) | 70 (56.79) | 63 (52.54) | 43 (40.98) | 40 (39.23) | 16 (23.58) | 2 (8.13) | 49 (44.43) |
| $V_5$ - Korangu samba | 38 (38.06) | 30 (33.21) | 22 (27.97) | 13 (21.13) | 7 (15.34) | 3 (9.97) | 0 (2.86) | 0 (2.86) | 14 (21.97) |
| $V_6$ - Kudhiraivaali samba | 24 | 19 | 14 | 9 | 4 | 3 | 0 | 0 | 9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (29.33) | (25.84) | (21.97) | (17.46) | (11.54) | (9.97) | (2.86) | (2.86) | (17.46) |
| $V_7$ - Manjal ponni | 32 (34.45) | 26 (30.66) | 26 (30.66) | 11 (19.37) | 6 (14.18) | 0 (2.86) | 0 (2.86) | 0 (2.86) | 13 (21.13) |
| $V_8$ - Naatu basmati | 24 (29.33) | 23 (28.66) | 18 (25.10) | 14 (21.97) | 10 (18.44) | 6 (14.18) | 2 (8.13) | 1 (5.74) | 12 (20.27) |
| $V_9$ - Nalan namak | 38 (38.06) | 34 (35.67) | 24 (29.33) | 10 (18.44) | 9 (17.46) | 6 (14.18) | 0 (2.86) | 0 (2.86) | 15 (22.79) |
| $V_{10}$ - Poovan samba | 12 (20.27) | 8 (16.43) | 2 (8.13) | 0 (2.86) | 0 (2.86) | 0 (2.86) | 0 (2.86) | 0 (2.86) | 3 (9.97) |
| $V_{11}$ - Sivan samba | 65 (53.73) | 51 (45.57) | 37 (37.47) | 28 (31.95) | 23 (28.66) | 12 (20.27) | 4 (11.54) | 0 (2.86) | 28 (31.95) |
| $V_{12}$ - Sorna | 90 (71.57) | 86 (68.03) | 82 (64.89) | 74 (59.34) | 64 (53.13) | 21 (27.28) | 12 (20.27) | 7 (15.34) | 55 (47.87) |
| $V_{13}$ - Thanga samba | 36 (36.87) | 34 (35.67) | 22 (27.97) | 12 (20.27) | 8 (16.43) | 4 (11.54) | 3 (9.97) | 2 (8.13) | 15 (22.79) |
| $V_{14}$ - Thengaipoo samba | 81 (64.16) | 66 (54.33) | 50 (45.00) | 30 (33.21) | 18 (25.10) | 8 (16.43) | 2 (8.13) | 0 (2.86) | 32 (34.45) |
| $V_{15}$ - Varigarudan samba | 20 (26.57) | 17 (24.35) | 10 (18.44) | 5 (12.92) | 2 (8.13) | 2 (8.13) | 0 (2.86) | 0 (2.86) | 7 (15.34) |
| $V_{16}$ - Vellaigundu samba | 48 (43.86) | 46 (42.71) | 42 (40.39) | 38 (38.05) | 10 (18.44) | 6 (14.18) | 4 (11.54) | 2 (8.13) | 25 (30.00) |
| Mean | 50 (45.00) | 43 (40.98) | 36 (36.87) | 27 (31.31) | 18 (25.10) | 11 (19.37) | 5 (12.92) | 2 (8.13) | 24 (29.33) |
| | D | | | V | | | DxV | | |
| SEd | 0.48 | | | 0.68 | | | 1.93 | | |
| CD (P=0.05) | 0.95 | | | 1.34 | | | 3.80 | | |

(*DAH-Days after harvest; V- varieties; D - days) (Values in parenthesis indicate arcsine transformed)

**Table 3:** Viability of the freshly harvested traditional rice variety seeds

| **Varieties** | **Viability (%)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **5 DAH** | **10 DAH** | **15 DAH** | **20 DAH** | **25 DAH** | **30 DAH** | **35 DAH** | **40 DAH** | **Mean** |
| $V_1$ - Arasamba | 96 (78.47) | 96 (78.47) | 96 (78.47) | 96 (78.47) | 96 (78.47) | 96 (78.47) | 95 (77.08) | 95 (77.08) | 96 (78.47) |
| $V_2$ - Chinnar | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 99 (84.26) |
| $V_3$ - Kaalabadh | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_4$ - Kandasaali | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) |
| $V_5$ - Korangu samba | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_6$ - Kudhiraivaali samba | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_7$ - Manjal ponni | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_8$ - Naatu basmati | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 98 (81.87) | 99 (84.26) |
| $V_9$ - Nalan namak | 100 (89.72) | 100 (89.72) | 100 (89.72) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) |
| $V_{10}$ - Poovan samba | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_{11}$ - Sivan samba | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_{12}$ - Sorna | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 99 (84.26) |
| $V_{13}$ - Thanga samba | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 99 (84.26) |
| $V_{14}$ - Thengaipoo samba | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 98 (81.87) | 98 (81.87) | 99 (84.26) |
| $V_{15}$ - Varigarudan samba | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) | 100 (89.72) |
| $V_{16}$ - Vellaigundu samba | 99 (84.26) | 99 (84.26) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) | 98 (81.87) |
| Mean | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) | 99 (84.26) |
| | D | | | V | | | DxV | | |
| SEd | 0.60 | | | 0.85 | | | 0.24 | | |
| CD (P=0.05) | 1.19 | | | 1.68 | | | 4.74 | | |

(*DAH-Days after harvest; V- varieties; D - days) (values in parenthesis indicate arcsine transformed)

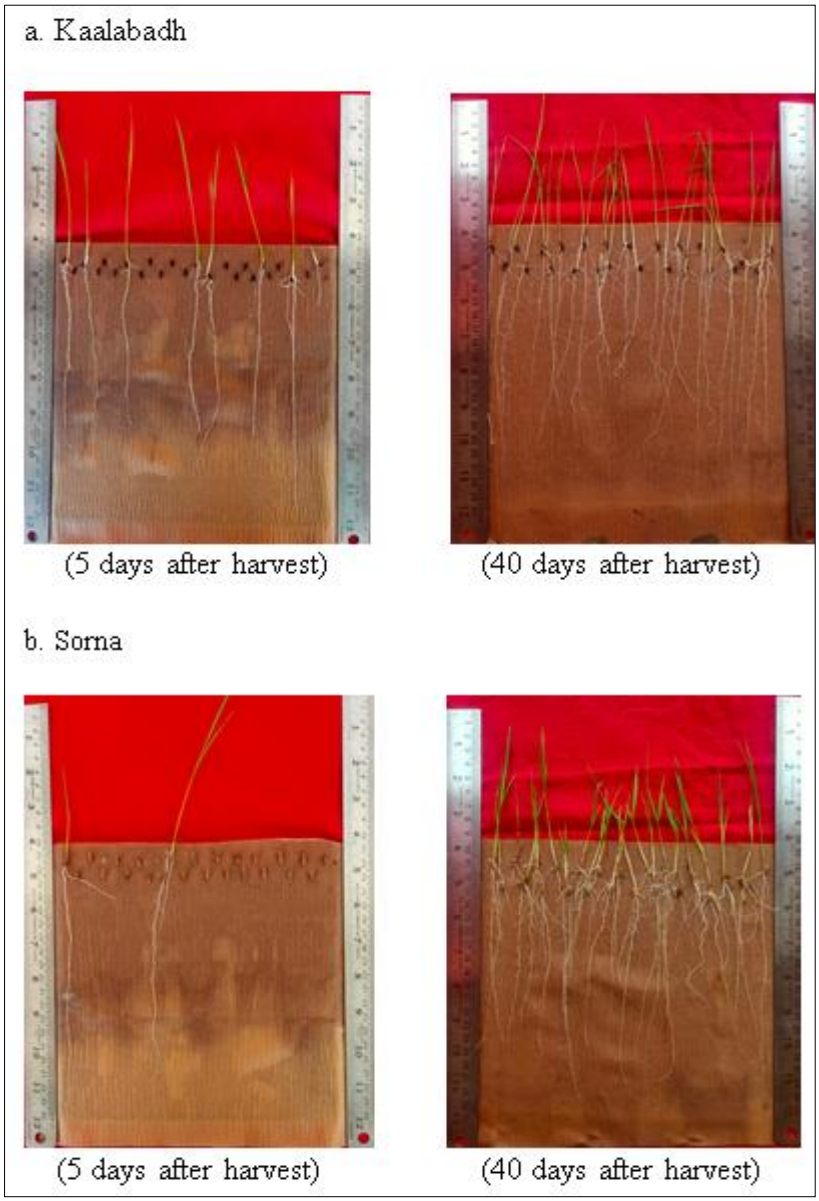


**Fig 1:** Differences in seed germination of traditional rice varieties

## Conclusion

The results of the present study revealed that the traditional rice varieties expressed medium to strong dormancy immediately after harvest and gradually decreased over the period of time and eventually becomes non-dormant after 40 days of harvest. The varieties *viz*., Chinnar, Kandasaali and Sorna were highly dormant compared to other varieties. By understanding the dormancy behaviour of rice seeds, breeder can use the traits to induce short term dormancy in cultivated varieties so as to prevent the problem of pre-harvest sprouting and to withstand adverse climatic conditions.

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