Biological Forum – An International Journal **13(4): 140-146(2021)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Assessment of Seed Dormancy in Different Rice Varieties

Chiranjeevi C. Kulkarni[1*], D. Lenka[1], K. C. Muduli[1], D.N. Bastia[2], S. Mohanty[1], R.K. Panda[3], S.K. Swain[4] and S.P. Monalisa[4]

[1]Department of Seed Science and Technology,
Odisha University of Agricultural and Technology, Bhubaneswar, Odisha, India.
[2]Department of Plant Breeding and Genetics,
Odisha University of Agricultural and Technology, Bhubaneswar, Odisha, India.
[3]Department of Plant Physiology, Odisha University of Agricultural and Technology, Bhubaneswar, Odisha, India.
[4]Department of Crop Physiology and Seed Technology, Institute of Agricultural Sciences, Siksha 'O' Anusandhan Deemed to be University, Bhubaneswar, Odisha, India.

(Corresponding author: Chiranjeevi C. Kulkarni[*])
(Received 16 August 2021, Accepted 11 October, 2021)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: An investigation has been planned to study the dormancy duration in different rice varieties. About 54 rice varieties of different groups (early, medium and late maturing) released from Odisha University of Agriculture and Technology (OUAT) and National Rice Research Institute (NRRI), Cuttack were studied for duration of seed dormancy. The fresh seeds of 54 rice varieties harvested during *kharif* 2017 exhibited variation in dormancy duration ranging from 4-79 days. Based on dormancy duration, the 54 rice varieties were classified into five categories *viz.*, very weak (0-7 days), weak (7-14 days), moderate (14-21 days), strong (21-28 days) and very strong (> 28 days). The least dormancy duration of 4.00 days was recorded in variety Khandagiri and the varieties CR Dhan 506 and CR Dhan 508 showed highest dormancy duration of 79.00 days. The study focuses on the existence of wide range of dormancy in 54 rice varieties for using them as donors in the future rice improvement programme.

Keywords: Duration of dormancy, Germination, Rice, Seed dormancy, Varieties

INTRODUCTION

Rice (*Oryza sativa* L.) is the second most widely consumed cereal in the world next to wheat. It is the staple food (Goufo, 2008) for two third of the world population (Kumari *et al*., 2014). Rice occupies a pivotal role in Indian agriculture. It is the staple food for more than 70 percent Indians and a source of livelihood for 120-150 million rural households. It provides more than fifty percent of daily calorie intake and considered as the cheapest source of food, energy and protein in the developing countries. India ranks second in the production of rice; as it is grown in almost all the states in India. Dormancy is problematic in agriculture as it affects plant establishment but it is the ability of the seeds to delay their germination until the time and place are right reflecting an important survival mechanism in plants. Dormancy is the temporary blocking of the growth of seeds before their maturation process is completed (Simpson, 2007). Dormancy is one mechanism by which seeds maintain their viability in unfavourable conditions. In spite of this advantage, dormancy creates problems for seed analysts and seed producers, especially when their germination percentage of seed lot must be determined in a few weeks after harvesting. Sometimes, even if the seeds germinate readily at harvest, due to unfavourable environmental conditions during storage or germination, secondary dormancy may develop.

Variation in seed dormancy has been reported in different varieties of rice (Agarwal, 1981; Siddique *et al*., 1988; Seshu and Dadlani, 1991). However, with the release of new varieties it has become necessary to study the duration of dormancy period for the farmer who takes up seed production or crop production immediately after the harvest and suggest to simple method to break it for conducting germination test after harvest under those conditions where it is essential to issue a certificate for the sale of seeds for regulatory purposes (Hanumanthappa *et al*., 2015). Seed dormancy in wild rice species normally extends from 3 to 6 months but in cultivates species, the dormancy period can be totally last as long as 4 months (Saadiah, 1992). The selected varieties need to be studied for their dormancy behaviour because in the coastal areas due to irregular rains in the last few years, pre-harvest sprouting problem has been reported in tropical cultivars (Agrawal and Nanda, 1969). By knowing the dormancy behaviour of different rice varieties, this problem can be prevented by growing dormant varieties instead of non-dormant varieties (Sooganna, 2012).

MATERIALS AND METHODS

The field and laboratory experiments were conducted at the Research plots of Department of Agronomy and Department of Seed Science and Technology, OUAT, Bhubaneswar during *kharif* 2017-18, respectively. Fifty-four rice varieties of different groups (early, medium and late maturing) released from OUAT and NRRI, were evaluated for duration of seed dormancy. These varieties were grown in randomized block design (RBD) with three replications in the experimental field. Standard agronomic practices were followed such as irrigation was given as and when required and care was taken to prevent water stress during the critical growth stages of the crop. The crop was harvested at harvestable maturity and the panicles were dried to about 10-12% moisture, while attached to the plants by the method of shade drying (Sahoo and Swain, 1983).

One hundred seed samples replicated four times, for each of the varieties were withdrawn for germination test to determine the trend of seed in germination. The germination tests were carried out under ambient temperature. The first test was done on the day of harvest. Germination counts were made on the l4th day (final count) and the computed germination percentage was based on normal seedling (Vasudevan *et al*., 2014) following ISTA rules (Anonymous, 1985). Dormancy was considered terminated when germination reached 80 %. Seeds were sown in petriplate on one sheet of Whatman no. 3 filter paper. Varieties that germinated (>80% germination) within 7 days were considered as non-dormant and those not germinated (<80% germination) were considered as dormant one. For these dormant varieties, germination was recorded after every seven days so that actual days taken for a variety to achieve 80% germination can be recorded. Days taken by a variety to achieve 80% germination from the date of harvest are considered as duration of seed dormancy (Sanghamitra *et al*., 2018). Based on dormancy duration, the 54 rice varieties were classified into five categories *viz.*, very weak (0-7 days), weak (7-14 days), moderate (14-21 days), strong (21-28 days) and very strong (> 28 days).

RESULT AND DISCUSSION

Seed dormancy a complex agronomic trait, under control of both environmental and genetic factors, is considered as an important trait in plant breeding programme as it affects grain yield and seed quality. It is well established that early and medium duration rice varieties had shorter span of dormancy compared to late duration varieties (Murthy *et al*., 1990). In this study about 54 varieties were studied for duration of seed dormancy. The seeds were allowed to germinate immediately after harvest and germination percentage was recorded. Among the varieties, ten varieties showed 80.00 % (var. Kharavela) to 99.33 % germination immediately after harvest (0th day) and in rest of the varieties, germination percentage of seeds immediately after harvest ranged from 1.00 % (0th day) to 99.66 % (84th day). The highest germination percentage was recorded by var. CR Dhan 506 (99.66 %) and the lowest was recorded by the varieties Mandakini, Surendra, Rajeswari, Jalamani, Jayantidhan, CR Dhan 408, CR Dhan 500 and CR Dhan 506 (1.00 %). Nil germination was recorded by the varieties Upahar, CR Dhan 305 and CR Dhan 508 (Table 1). Germination was low immediately after harvest and gradually increased to reach steady stage of 80 %. Results obtained showed that all the varieties tested had some degree of dormancy.

Based on the dormancy duration, the varieties were classified into five categories *viz*., very weak (0-7 days), weak (7-14 days), moderate (14-21 days), strong (21-28 days) and very strong (>28 days). In *kharif* 2017, among 54 rice varieties, 10 varieties fell into very weak, 3 varieties fell under moderate category, 9 varieties fell into strong and 32 varieties fell under very strong dormant class. None of the varieties fell into weak dormant class (Table 2). Seeds produced in *kharif* season exhibited longer dormancy period. In other words, expression of the character was highest in *kharif* season. This might be due to synthesis of higher amount of phenolics and/or abscisic acid in the seeds of *kharif* season.

Rao (1994) observed longer dormancy in rice seeds produced in *kharif*. Hanumanthappa *et al.*, (2016)studied that dormancy duration in paddy genotypes and reported that ranged from 0-35 days. Saritha (2004) reported that variation in dormancy duration ranged from 0-42 days for 81 rice varieties. Gianinetti and Cohn (2008) reported that the primary dormancy of red rice was released after 45 days of ripening. Studies conducted by Kalitha *et al*., 1994showed that 155 genotypes were non-dormant and 57 had dormancy ranging from 7-35 days. Franco (1997) confirmed that the seeds exhibit post-harvest dormancy that can persist for 90-120 days in cultivated rice, depending on the cultivar. Mahadevappa and Nandisha, 1987 found that the duration of seed dormancy in rice varied from 0-12 weeks. The variation in dormancy in paddy genotypes may be due to genetic makeup of the seeds (Chang and Tagumpay, 1973 and Agarwal, 1981), influence of the environment on the expression of the genetic capabilities, the impermeability of seed coat to water and the balance between the presence of germination inhibitors and promoters in the seed (Hayashi and Himeno, 1974) and mechanical restriction by seed parts which largely determine the inhibition and progress of the physiological processes that are involved in germination and seedling emergence.

Padma and Reddy (2000) recorded that the Surekha and Phalguna rice varieties did not show dormancy and registered standard germination certification (80%) immediately after harvest, whereas the period of dormancy was four weeks in CSR 18, Chaitanya and Krishnaveni, six weeks in Pusa Basmati and Basmati 370 and seven weeks in Basmati Pakistan, CSR 13, RNR 32341 and WGL 48684.

Table 1: Evaluation of seed germination percentage at 7 days interval in 54 rice varieties grown during *kharif* 2017.

Sr. no.	Varieties	Germination %												
		Days after harvest (DAH)												
		0	7	14	21	28	35	42	49	56	63	70	77	84
1	Jogesh	26.66 (31.09)	50.66 (45.38)	62.00 (51.94)	84.66 (66.94)	-	-	-	-	-	-	-	-	-
2	Badami	82.00 (64.90)	-	-	-	-	-	-	-	-	-	-	-	-
3	Ghanteswari	81.66 (64.64)	-	-	-	-	-	-	-	-	-	-	-	-
4	Udayagiri	98.66 (83.35)	-	-	-	-	-	-	-	-	-	-	-	-
5	Lalitagiri	92.00 (73.57)	-	-	-	-	-	-	-	-	-	-	-	-
6	Nilagiri	83.33 (65.90)	-	-	-	-	-	-	-	-	-	-	-	-
7	Khandagiri	84.33 (66.68)	-	-	-	-	-	-	-	-	-	-	-	-
8	Sidhanta	84.33 (66.68)	-	-	-	-	-	-	-	-	-	-	-	-
9	Mandakini	1.00 (5.74)	22.66 (28.43)	45.33 (42.32)	65.00 (53.73)	83.00 (65.65)	-	-	-	-	-	-	-	-
10	CR Dhan 101	8.33 (16.78)	30.33 (33.42)	51.00 (45.57)	62.00 (51.94)	84.66 (66.94)	-	-	-	-	-	-	-	-
11	CR Dhan 202	5.00 (12.92)	7.66 (16.07)	31.00 (33.83)	50.66 (45.38)	89.66 (71.24)	-	-	-	-	-	-	-	-
12	CR Dhan 203	9.33 (17.79)	26.66 (31.09)	38.66 (38.45)	60.00 (50.77)	80.33 (63.67)	-	-	-	-	-	-	-	-
13	Jajati	14.00 (21.97)	20.33 (26.80)	21.66 (27.74)	42.66 (40.78)	55.33 (48.06)	73.00 (58.69)	91.33 (72.88)	-	-	-	-	-	-
14	Gouri	8.66 (17.110	21.66 (27.74)	27.66 (31.73)	42.66 (40.78)	53.66 (47.10)	69.00 (56.17)	86.00 (68.03)	-	-	-	-	-	-
15	Gajapati	4.00 (11.54)	17.33 (24.60)	28.00 (31.95)	52.33 (46.34)	79.66 (63.19)	-	-	-	-	-	-	-	-
16	Surendra	1.33 (6.62)	13.33 (21.41)	38.33 (38.25)	49.66 (44.81)	75.33 (60.22)	90.00 (71.57)	-	-	-	-	-	-	-
17	Gobinda	6.00 (14.18)	20.00 (26.57)	32.33 (34.65)	39.66 (39.03)	52.66 (46.52)	72.00 (58.05)	86.33 (68.30)	-	-	-	-	-	-
18	Birupa	12.33 (20.56)	23.66 (29.11)	52.33 (46.34)	74.33 (59.56)	84.66 (66.94)	-	-	-	-	-	-	-	-
19	Manaswini	3.66 (11.03)	12.00 (20.27)	27.66 (31.73)	41.66 (40.20)	68.66 (55.96)	78.00 (62.03)	94.66 (76.64)	-	-	-	-	-	-
20	Bhoi	2.66 (9.39)	13.66 (21.69)	35.66 (36.67)	55.33 (48.06)	73.66 (59.12)	84.00 (66.42)	-	-	-	-	-	-	-

21	Rajeswari	0.66 (4.66)	24.33 (29.55)	36.66 (37.26)	50.33 (45.19)	57.66 (49.41)	75.00 (60.00)	90.66 (72.20)	-	-	-	-	-	-
22	Sebati	5.66 (13.76)	25.00 (30.00)	40.00 (39.23)	59.66 (50.57)	80.00 (63.44)	-	-	-	-	-	-	-	-
23	Tejaswini	28.00 (31.95)	49.00 (44.43)	68.00 (55.55)	85.33 (67.48)	-	-	-	-	-	-	-	-	-
24	Pradeep	9.00 (17.46)	23.66 (29.11)	31.66 (34.24)	45.00 (42.13)	79.00 (62.73)	89.00 (70.63)	-	-	-	-	-	-	-
25	Kharavela	80.00 (63.44)	-	-	-	-	-	-	-	-	-	-	-	-
26	Hiranmayee	13.66 (21.69)	28.00 (31.95)	56.33 (48.64)	64.00 (53.13)	77.66 (61.79)	92.00 (73.57)	-	-	-	-	-	-	-
27	Konark	84.00 (66.42)	-	-	-	-	-	-	-	-	-	-	-	-
28	Pratibha	24.00 (29.33)	34.66 (36.07)	48.33 (44.04)	65.33 (53.93)	70.33 (57.00)	84.00 (66.42)	-	-	-	-	-	-	-
29	Pratap	28.33 (32.16)	34.66 (36.07)	42.33 (40.59)	68.66 (55.96)	80.66 (63.91)	-	-	-	-	-	-	-	-
30	Jalamani	0.66 (4.66)	3.33 (10.51)	5.00 (12.92)	9.33 (17.79)	13.66 (21.69)	18.00 (25.10)	21.66 (27.74)	31.33 (34.04)	47.33 (43.47)	56.00 (48.45)	75.00 (60.00)	89.66 (71.24)	-
31	Meher	21.33 (27.51)	48.66 (44.23)	63.00 (55.54)	88.33 (70.02)	-	-	-	-	-	-	-	-	-
32	Samanta	5.00 (12.92)	14.00 (21.97)	19.66 (26.32)	58.00 (49.60)	80.00 (63.44)	-	-	-	-	-	-	-	-
33	Bhubana	9.66 (18.11)	19.66 (26.32)	25.00 (30.00)	33.66 (35.46)	39.66 (39.03)	43.33 (41.17)	74.33 (59.56)	92.66 (74.28)	-	-	-	-	-
34	Urbashi	18.66 (25.59)	26.66 (31.09)	40.66 (39.62)	64.33 (53.33)	70.66 (57.20)	83.00 (65.65)	-	-	-	-	-	-	-
35	Hasanta	6.00 (14.18)	9.00 (17.46)	13.66 (21.69)	28.66 (32.37)	35.33 (36.47)	53.00 (46.72)	64.66 (53.52)	86.66 (68.58)	-	-	-	-	-
36	Mahanadi	11.00 (19.37)	17.66 (24.85)	20.66 (27.03)	34.66 (36.07)	46.33 (42.90)	47.00 (43.28)	57.00 (49.02)	67.66 (55.34)	78.00 (62.03)	83.0 (65.65)	-	-	-
37	Indravati	6.33 (14.57)	11.00 (19.37)	17.33 (24.60)	29.00 (32.58)	38.66 (38.45)	67.00 (54.94)	83.00 (65.65)	-	-	-	-	-	-
38	Mrunalini	2.00 (8.13)	6.00 (14.18)	9.33 (17.79)	21.66 (27.74)	48.66 (44.23)	60.00 (50.77)	72.66 (58.47)	89.33 (70.93)	-	-	-	-	-
39	Jagabandhu	3.66 (11.03)	8.66 (17.11)	12.00 (20.27)	27.33 (31.52)	38.66 (38.45)	67.00 (54.94)	97.33 (80.60)	-	-	-	-	-	-
40	Prachi	99.33 (85.30)	-	-	-	-	-	-	-	-	-	-	-	-
41	Ramachandi	11.00 (19.37)	15.66 (23.31)	24.33 (29.55)	58.66 (49.99)	66.66 (54.73)	81.66 (64.64)	-	-	-	-	-	-	-
42	Asutosh	13.00 (21.13)	19.33 (26.08)	26.33 (30.87)	37.00 (37.47)	47.66 (43.66)	53.00 (46.72)	68.00 (55.55)	75.00 (60.00)	91.33 (72.88)	-	-	-	-

43	Tanmayee	14.33 (22.24)	20.33 (26.80)	29.33 (32.79)	37.33 (37.66)	50.33 (45.19)	67.00 (54.94)	82.00 (64.90)	-	-	-	-	-	-
44	Bhanja	17.00 (24.35)	28.66 (32.37)	32.33 (34.65)	54.66 (47.67)	87.00 (68.87)	-	-	-	-	-	-	-	-
45	Upahar	0.00 (0.0025)	5.00 (12.92)	9.66 (18.11)	13.66 (21.69)	17.33 (24.60)	24.00 (29.33)	30.33 (33.42)	65.66 (54.13)	97.33 (80.60)	-	-	-	-
46	Panidhan	4.00 (11.54)	6.66 (14.96)	19.33 (26.08)	24.66 (29.77)	35.66 (36.67)	45.33 (42.32)	72.33 (58.26)	88.00 (69.73)	-	-	-	-	-
47	Jayantidhan	0.66 (4.66)	3.33 (10.51)	6.33 (14.57)	8.66 (17.11)	13.66 (21.69)	20.00 (26.57)	32.00 (34.45)	60.33 (50.96)	75.00 (60.00)	97.00 (80.03)	-	-	-
48	CR Dhan 305	0.00 (0.0025)	12.33 (20.56)	30.66 (33.62)	44.66 (41.93)	68.33 (55.75)	74.00 (59.34)	90.33 (71.88)	-	-	-	-	-	-
49	CR Dhan 408	1.00 (5.74)	2.00 (8.13)	5.33 (13.35)	10.66 (19.06)	15.33 (23.05)	19.00 (25.84)	23.66 (29.11)	35.00 (36.27)	51.00 (45.57)	67.33 (55.14)	75.33 (60.22)	95.66 (77.98)	-
50	CR Dhan 500	1.00 (5.74)	1.00 (5.74)	4.00 (11.54)	7.66 (16.07)	15.66 (23.31)	21.00 (27.27)	28.66 (32.37)	37.66 (37.86)	59.66 (50.57)	77.00 (61.34)	92.00 (73.57)	-	-
51	CR Dhan 505	2.66 (9.39)	7.66 (16.07)	9.66 (18.11)	13.66 (21.69)	19.00 (25.84)	25.00 (30.00)	43.66 (41.36)	57.66 (49.41)	64.33 (53.33)	71.33 (57.63)	92.66 (74.28)	-	-
52	CR Dhan 506	1.66 (7.40)	5.33 (13.35)	9.33 (17.79)	13.00 (21.13)	15.00 (22.79)	19.00 (25.84)	23.00 (28.66)	30.33 (33.42)	32.66 (34.85)	43.00 (40.98)	58.66 (49.99)	75.33 (60.22)	99.66 (86.66)
53	CR Dhan 507	2.00 (8.13)	2.66 (9.39)	4.33 (12.01)	7.00 (15.34)	12.33 (20.56)	26.00 (30.66)	44.00 (41.55)	52.66 (46.52)	61.66 (51.74)	70.33 (57.00)	89.66 (71.24)	-	-
54	CR Dhan 508	0.00 (0.0025)	1.66 (7.40)	2.00 (8.13)	5.00 (12.92)	10.00 (18.43)	11.00 (19.37)	13.00 (21.13)	25.00 (30.00)	40.66 (39.62)	52.66 (46.52)	69.00 (56.17)	77.33 (61.57)	98.66 (83.35)
	Mean	22.86 (24.81)	14.73 (19.32)	23.19 (25.19)	35.00 (32.83)	40.97 (35.92)	27.94 (25.34)	27.63 (23.95)	16.57 (14.29)	12.94 (11.01)	11.44 (9.50)	10.23 (8.25)	6.26 (5.02)	3.67 (3.16)

Figures in parentheses indicate arcsine transformed values

Table 2: Period of dormancy in 54 rice varieties grown during *kharif* 2017.

Period of dormancy	Varieties
VWD: Very weak dormancy (0-7 days)	Badami, Ghanteswari, Udayagiri, Lalitagiri, Nilagiri, Khandagiri, Sidhanta, Kharavela, Konark & Prachi
WD: Weak dormancy (7-14 days)	Nil
MD: Moderate dormancy (14-21 days)	Jogesh, Tejaswini & Meher
SD: Strong dormancy (21- 28 days)	Mandakini, CR Dhan 101, CR Dhan 202, CR Dhan 203, Birupa, Sebati, Pratap, Samanta & Bhanja
VSD: Very strong dormancy (> 28 days)	Jajati, Gouri, Gajapati, Surendra, Gobinda, Manaswini, Bhoi, Rajeswari, Pradeep, Hiranmayee, Pratibha, Jalamani, Bhubana, Urbashi, Hasanta, Mahanadi, Indravati, Mrunalini, Jagabandhu, Ramachandi, Asutosh, Tanmayee, Upahar, Panidhan, Jayantidhan, CR Dhan 305, CR Dhan 408, CR Dhan 500, CR Dhan 505, CR Dhan 506, CR Dhan 507 & CR Dhan 508

VWD: Very weak dormancy (0-7 days), **WD**: Weak dormancy (7-14 days), **MD**: Moderate dormancy (14-21 days), **SD**: Strong dormancy (21- 28 days) and **VSD**: very strong dormancy (> 28 days)

Swain *et al*. (2001) recorded that the dormancy period of the varieties ranged from 33 to 107 days in groundnut varieties. Mathur *et al*. (2000) announced that two groundnuts viz. cultivars, PBS-12115 and PBS-12126, had 21-28 days and 14-21 days respectively of fresh seed dormancy. Singh *et al*. (2002) screened five distinct groundnut cultivars for dormancy period, revealing that all cultivars have dormancy periods ranging from 4 to 5 months.

CONCLUSION

From the entire experiment, it can be concluded that, the late maturing varieties have long dormancy period as compared to early and medium maturing varieties. It can also be revealed that the dormancy was higher during *kharif* season due to reduction in photosynthesis.

FUTURE SCOPE

The present study would be helpful to the seed producers and breeders for planning seed production programmes to utilise these varieties in crop improvement programme to incorporate seed dormancy into the popular varieties which are non-dormant in nature to avoid pre-harvest sprouting problem during monsoon seasons. The varietal difference of dormancy duration needs to be studied further at biochemical and molecular level.

Acknowledgment. Authors are gratefully acknowledged to the Department of Science and Technology (DST, Government of India), New Delhi for providing financial assistance for this research work through INSPIRE Fellowship.

Conflict of Interest. Authors have no conflict of interest.

REFERENCE

Agarwal P. K. (1981). Genotypic variation in seed dormancy of paddy and simple methods to break it. *Seed Research*, *9*: 20-27.

Agrawal, P. K. and Nanda J. S. (1969). A note on dormancy in rice. *Riso*, *18:* 325-326.

Anonymous (1985). The germination tests. *Seed Science & Technology*, *13*(2): 421-463.

Chang, T. T. and Tangupay, O. (1973). Inheritance of grain dormancy in relation to growth duration in 10 rice crosses. *SABRO News Letter*, *5*: 87-94.

Franco. (1997). Variation in the Loss of Seed Dormancy during after ripening of Wild and Cultivated Rice Species. *Annals of Botany*, *94*: 865–872.

Gianinetti, A. and Cohn, M. A. (2008). Seed dormancy in red rice. XIII: Interaction of dry-after ripening and hydration temperature. *Seed Science Research*, *18*(3): 151-159.

Goufo, P. (2008). Rice production in Cameroon: a review. *Research Journal of Agriculture and Biological Sciences*, *4*(6): 745-756.

Hanumanthappa, D., Vasudevan, S., Ibrahim, M., Shakuntala, N., Amaregouda A. and Doddagoudar, S. (2015). Studies on seed dormancy in paddy genotypes. *International Journal of Environmental Science*, *9*: 261-263.

Hanumanthappa, D., Vasudevan, S., Kisan, B., Wali, V., Anil S. and Maruthi, K. (2016). Mechanism and duration of seed dormancy in paddy genotypes. *Environment and Ecology*, *34*(4C): 2236-2240.

Hayashi, M. and Himeno, M. (1974). Studies on the dormancy and germination of rice seed. III Relations between germination of immature seed and seed dormancy and growth inhibitors in rice. *Japanese Journal of Tropical Agriculture*, *17*: 245-249.

Kalitha, U. C., Baruah D. K. and Upadhaya, L. P. (1994). Seed dormancy in germplasm collection of rice (*Oryza sativa*) insensitive to photoperiod. *Indian Journal of Agricultural Sciences*, *64*: 160-164.

Kumari, P., Mishra, G. C., Pant, A. K., Shukla G. and Kujur, S. N. (2014). Comparison of forecasting ability of different statistical models for productivity of rice (*Oryza sativa* L.) in India. *The Ecoscan*, *8*: 193-198.

Mahadevappa, M. and Nandisha, B. S. (1987). A view of the status of genetic analysis of characters important in harvest, post-harvest and seed technology of rice (*Oryza sativa* L.) in Southern India. *Seed Science and Technology*, *15*: 585-591.

Murthy, P., Reddy P. and Prasad, S.(1990). Seed dormancy of rice varieties released by Andhra Pradesh Agricultural University (APAU). *International Rice Research Newsletter*, *15*(6): 6-7.

Mathur, R. K., Manivel, P., Samdur M. Y. and Bandopadhyay, A. (2000). Screening for fresh seed dormancy in Spanish bunch groundnut. *Journal of Oilseeds Research*, *17*(1): 181-182.

Padma, V. and Reddy, B. M. M. (2000). Evaluation of rice genotypes for dormancy duration and seed stability under natural accelerated ageing. *Seed Research*, *28*(2): 158-165.

Rao S.P. (1994). Studies on seed dormancy in traditional rice varieties as affected by seasons. *Indian Journal of Plant physiology*, *33*: 113-115.

Saadiah A.S.H. (1992). Post-harvest seed dormancy in local rice varieties. *MARDI Research Journal*, *20*(1): 29-35.

Sahoo, P. and Swain, S. K. (1983). Methods of drying to prolong viability of groundnut seeds in storage. *III All India Seed Technology Research Workshop held at UAS, Bangalore*, on 23-25 May, 1983.

Sanghamitra, P.,Sahu, R. K.,Singh, L.K., Moharana, D., Bagchi, T. B., Munda, S., Sarkar, S., Basak, N., Kumar, G., Yadav, M. G., Bose, L. K., Marandi, B. C., Meher J. and Subuddhi, H. N. (2018). Does ecology has an impact on seed dormancy?. *Oryza*, *55*(3): 445-451.

Saritha A. (2004). Assessment of seed dormancy duration and braking methods in rice genotypes (*Oryza sativa* L.). *M.Sc. (Agri) Thesis*, ANGRAU, Rajendranagar, Hyderabad.

Seshu, D. V. and Dadlani, V. (1991). Mechanism of seed dormancy in rice. *Seed Science Research*, *1*(3):187-194.

Siddique, S. B., Seshu D. V. and Pardee, W. D. (1988). Classification of dormancy in rice and release from dormancy by moist heat treatment. *SABRAO Journal of Breeding and Genetics*, *20*(1): 1-18.

Simpson G. M. (2007). Seed dormancy in grasses Cambridge University Press, Cambridge, New York, Port Chester, Melbourne and Sydney.

Singh, C. B., Verma, R. K., Khan, A. A., Singh N. B. and Uttam, A. K. (2002). Dormancy behaviour and overcoming method in groundnut. *Seed Research*, *30*(2): 211-214.

Sooganna, L. V., Subbarao, P., Kiran Babu, P., Chaitanya U. and Keshavulu, K. (2012). Effect of maleic hydrazide on induction of seed dormancy and seed quality parameters in rice. *Seed Research*, *40*(2): 124-133.

Swain, S.K., Sahoo P. and Patnaik, M. C. (2001). Seed dormancy in groundnut (*Arachis hypogaea* L.). Variability for intensity and duration. *Seed Research*, *29*(1): 13-17.

Vasudevan, S. N., Maruthi, J. B., Doddagoudar, S. R., Raghu B. N. and Hanumanthappa, D. (2014). Correlation of different vigour tests with field emergence of paddy genotypes. *The Ecoscan*. *6*: 333-337.

How to cite this article: Kulkarni, Chiranjeevi C.; Lenka, D.; Muduli, K. C.; Bastia, D.N.; Mohanty, S.; Panda, R.K.; Swain, S.K. and Monalisa, S.P. (2021). Assessment of Seed Dormancy in Different Rice Varieties. *Biological Forum – An International Journal*, *13*(4): 140-146.