List of Tables

Table 1 . Unweighted and weighted Rate of germination of EGV

Fraction	0.1	0.25	0.5	0.75	0.9
15℃	0.0104 (0.0010)	0.0098 (0.0025)	0.0090 (0.0045)	0.0082 (0.0062)	0.0060 (0.0054)
20℃	0.0163 (0.0016)	0.0155 (0.0039)	0.0142 (0.0071)	0.0128 (0.0096)	0.0119 (0.0107)
25℃	0.0254 (0.0025)	0.0204 (0.0051)	0.0183 (0.0091)	0.0164 (0.0123)	0.0135 (0.0122)
30℃	0.0357 (0.0036)	0.0294 (0.0074)	0.0236 (0.0118)	0.0193 (0.0145)	0.0167 (0.0150)
35℃	0.0361 (0.0036)	0.0289 (0.0072)	0.0236 (0.0118)	0.0202 (0.0152)	0.0170 (0.0153)

Values within brackets indicate weighted rate of germination

Table 2 . Unweighted and weighted Rate of germination of MGV

Fraction	0.1	0.25	0.5	0.75	0.9
15℃	0.0117 (0.0012)	0.0111 (0.0028)	0.0101 (0.0050)	0.0089 (0.0067)	0.0083 (0.0075)
20℃	0.0183 (0.0018)	0.0163 (0.0041)	0.0152 (0.0076)	0.0180 (0.0135)	0.0128 (0.0115)
25℃	0.0270 (0.0027)	0.0244 (0.0061)	0.0211 (0.0105)	0.0171 (0.0128)	0.0149 (0.0134)
30℃	0.0386	0.0347	0.0297	0.0245	0.0215

	(0.0039)	(0.0087)	(0.0148)	(0.0183)	(0.0194)
35°C	0.0385	0.0323	0.0261	0.0227	0.0210
	(0.0038)	(0.0081)	(0.0131)	(0.0170)	(0.0189)

Values within brackets indicate weighted rate of germination

Table 3 . Unweighted and weighted Rate of germination of LGV

Fraction	0.1	0.25	0.5	0.75	0.9
15°C	0.0100	0.0094	0.0085	0.0073	0.0070
	(0.0010)	(0.0024)	(0.0043)	(0.0055)	(0.0063)
20°C	0.0164	0.0154	0.0141	0.0124	0.0112
	(0.0016)	(0.0039)	(0.0070)	(0.0093)	(0.0101)
25°C	0.0258	0.0219	0.0185	0.0159	0.0139
	(0.0026)	(0.0055)	(0.0093)	(0.0119)	(0.0125)
30°C	0.0272	0.0250	0.0222	0.0183	0.0139
	(0.0027)	(0.0063)	(0.0111)	(0.0137)	(0.0125)
35°C	0.0307	0.0259	0.0224	0.0187	0.0152
	(0.0031)	(0.0065)	(0.0112)	(0.0140)	(0.0136)

Values within brackets indicate weighted rate of germination

Table 4: Error sum of squares of cumulative proportion of germination under probit and logit

Temperature	EGV		MGV		LGV	
	Probit	Logit	Probit	Logit	Probit	Logit
15°C	0.487	0.060	0.061	0.904	0.038	0.061
20°C	0.415	0.138	0.098	0.966	0.062	0.138
25°C	0.200	0.055	0.018	0.803	0.092	0.192
30°C	0.151	0.098	0.102	0.938	0.033	0.080
35°C	0.001	0.059	0.059	0.436	0.050	0.015

Table 5: Error sum of squares of the predicted rate of germination under probit and logit

Temperature	EGV		MGV		LGV	
	Probit	Logit	Probit	Logit	Probit	Logit
15°C	4.45E-05	2.96E-06	7.33E-06	5.0E-05	3.69E-06	2.73E-06
20°C	1.96E-05	1.49E-05	4.32E-05	1.5E-04	2.53E-05	2.69E-05
25°C	1.39E-05	1.11E-05	2.62E-06	9.5E-05	6.11E-05	9.38E-05
30°C	1.48E-05	7.08E-05	8.28E-05	1.4E-04	5.47E-03	4.68E-05
35°C	1.42E-05	9.67E-06	4.67E-05	3.1E-04	6.63E-06	3.36E-05

Table 6: Temperature wise R^2 between probit and log time and logit and log time

Temperature	EGV	MGV	LGV
	Logit (R^2)	Probit(R^2)	Probit(R^2)
15°C	0.933	0.871	0.896
20°C	0.984	0.916	0.952
25°C	0.971	0.923	0.977
30°C	0.976	0.971	0.919
35°C	0.995	0.961	0.954

Table 7: Seed germination characteristics of rice varieties

	Base Temp. (Tb ℃)		Lower θ_T (^{o}hour)		Upper θ_T (^{o}hour)		θ_T (10-90) (^{o}hour)		Log θ_T (log^{o}hour)[a]		SD θ_T (^{o}hour)		σ θ_T (log^{o}hour)		θ_{T50} (^{o}hour)	
	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit
EGV	5	5	834.63	865.58	1668.24	1520.20	833.61	654.62	7.06± 0.048	7.07± 0.046	278.68	266.71	0.23	0.12	1184	1178
MGV	5	5	707.69	707.69	1391.31	1391.31	683.62	683.62	6.90± 0.056	6.90± 0.054	226.38	225.02	0.22	0.12	998	998
LGV	4	4	951.46	1075.56	1775.79	1539.79	824.33	464.23	7.17± 0.050	7.17± 0.052	267.90	258.67	0.20	0.11	1301	1299

[a] 95% confidence interval

Table 8: Estimation of T_b using constrained least squares for EGV, MGV and LGV

Fraction	EGV				MGV				LGV			
	T_b	â(g)	$_T$(g)	Initial b_0(g)	T_b	â(g)	$_T$(g)	Initial b_0(g)	T_b	â(g)	$_T$(g)	Initial b_0(g)
0.10	5.00	-0.0055	827.394	0.0014	4.46	-0.0058	757.610	0.0020	2.90	-0.0029	995.969	0.0010
0.25	4.00	-0.0046	989.796	0.0007	4.64	-0.0051	862.087	0.0013	3.13	-0.0025	1141.199	0.0004
0.5	3.75	-0.0040	1144.970	0.0001	4.39	-0.0043	1014.387	0.0006	3.14	-0.0022	1302.456	0.0002
0.75	4.80	-0.0025	1812.910	0.0001	4.75	-0.0038	1159.672	0.0002	3.00	-0.0019	1544.851	0.0001
0.90	4.67	-0.0029	1573.754	0.0001	4.71	-0.0033	1326.752	0.0003	3.00	-0.0016	1870.541	0.0001

Table 9: Testing of Goodness of fit of LL distribution

MPa (Variety)	Observed	d.f .	p-value
-.3 (EGV)	24.64	16	0.07
-.3 (MGV)	9.20	11	0.60
-.3 (LGV)	18.88	15	0.21
-.5 (EGV)	5.28	17	0.99
-.5(MGV)	18.65	18	0.41
-.5(LGV)	14.93	23	0.89
-.7 (EGV)	12.94	15	0.45
-.7 (MGV)	36.72	21	0.02
-.7(LGV)	28.65	13	0.01
-1 (EGV)	31.78	21	0.06
-1 (MGV)	0.85	23	1
-1(LGV)	7.40	18	0.98

Table 10: Testing of hypothesis, at -0.3 MPa

-0.3 MPa	Model	$L(\Theta_{max};.)$	$L(\Theta_1;.)$	$L(\Theta_0;.)$	F-value	p-value
EGV	Likelihood	-351.04	-351.059	-351.06	1.06	0.42
	D.F.	-	11	15	(4,11)	-
MGV	Likelihood	-309.96	-320.27	-334.59	2.08	0.20
	D.F.	-	6	10	(4,6)	-
LGV	Likelihood	-363.39	-379.05	-382.51	0.54	0.71
	D.F.	-	10	14	(4,10)	-

Table 11: Testing of hypothesis, at -0.5 MPa

-0.5 MPa	Model	$L(\Theta_{max};.)$	$L(\Theta_1;.)$	$L(\Theta_0;.)$	F-value	p-value

EGV	Likelihood	-370.50	-384.38	-390.22	1.26	0.33
	D.F.	-	12	16	(4,12)	-
MGV	Likelihood	-355.40	-371.02	-376.97	1.23	0.34
	D.F.	-	13	17	(4,13)	-
LGV	Likelihood	-195.64	-423.04	-429.92	0.13	0.96
	D.F.	-	18	22	(4,22)	-

Table 12: Testing of hypothesis, at -0.7 MPa

-0.7 MPa	Model	$L(\Theta_{max};.)$	$L(\Theta_1;.)$	$L(\Theta_0;.)$	**F-value**	**p-value**
EGV	Likelihood	-404.20	-433.39	-439.57	0.84	0.51
	D.F.	-	16	20	(4,16)	-
MGV	Likelihood	-373.81	-433.008	-448.92	1.34	0.28
	D.F.	-	20	24	(4,20)	-
LGV	Likelihood	-419.19	-467.15	-473.05	0.79	0.54
	D.F.	-	26	30	(4,26)	-

Table 13: Testing of hypothesis, at -1 MPa

-1 MPa	Model	$L(\Theta_{max};.)$	$L(\Theta_1;.)$	$L(\Theta_0;.)$	**F-value**	**p-value**
EGV	Likelihood	-303.46	-403.43	-414.98	0.47	0.75
	D.F.	-	18	22	(4,18)	-
MGV	Likelihood	-346.62	-378.66	-382.55	0.48	0.75
	D.F.	-	16	20	(4,16)	-
LGV	Likelihood	-269.97	-304.25	-308.92	0.44	0.77
	D.F.	-	13	17	(4,13)	-

Table 14: Parameter estimates with standard error and interval estimate for EGV (TTE)

Water potential (MPa)	Parameters estimates	15℃	20℃	25℃	30℃	35℃
0	*b*			-7.82(0.46) (-8.75,-6.90)		
	d	0.91(0.02) (0.87,0.95)	1(0.07) (0.86,1)	0.97(0.05) (0.87,1)	0.91(0.03) (0.85,0.97)	0.91(0.04) (0.83,0.99)
	e	53.13(3.54) (46.05,60.21)	23.00(2.05) (18.90,27.11)	30.57(1.75) (27.06,34.07)	18.17(1.51) (15.15,21.19)	29.95(1.48) (26.99,32.91)
-0.3	*b*			-9.66(0.79) (-11.24,-8.09)		
	d	0.99(0.04) (0.91,1.06)	1.03(0.05) (0.94,1.12)	0.97(0.03) (0.91,1.04)	0.81(0.03) (0.75,0.87)	0.86(0.03) (0.80,0.92)
	e	55.36(2.47) (50.42,60.30)	47.08(1.46) (44.16,50.01)	24.40(1.03) (22.34,26.45)	21.72(1.16) (19.40,24.03)	18.83(1.19) (16.45,21.21)
-0.5	*b*			-8.21(0.54) (-9.30,-7.12)		
	d	1.01(0.02) (0.96,1.06)	0.98(0.03) (0.92,1.04)	0.99(0.02) (0.95,1.03)	0.85(0.05) (0.74,0.95)	0.88(0.05) (0.79,0.97)
		45.23(4.28)	30.36(2.92)	25.06(1.60)	29.82(2.00)	20.89(1.57)

	e	(36.67,53.79)	(24.51,36.21)	(21.85,28.26)	(25.82,33.82)	(17.75,24.03)
	b			-8.05(0.55) (-9.15,-6.95)		
-0.7	*d*	0.94(0.03) (0.88,1.01)	0.82(0.05) (0.71,0.93)	0.72(0.07) (0.58,0.85)	0.65(0.07) (0.51,0.79)	0.89(0.05) (0.79,0.98)
	e	55.74(4.90) (45.95,65.53)	35.58(3.50) (28.59,42.58)	28.73(2.73) (23.27,34.19)	22.48(2.46) (17.55,27.40)	15.17(1.73) (11.72,18.62)
	b			-8.20(0.74) (-9.67,-6.73)		
-1	*d*	0.44(0.07) (0.29,0.59)	0.84(0.07) (0.70,0.97)	0.56(0.07) (0.42,0.70)	0.49(0.07) (0.34,0.63)	0.38(0.07) (0.24,0.52)
	e	85.04(11.48) (62.08,108.01)	44.99(3.88) (37.23,52.75)	22.55(3.87) (14.82,30.28)	22.72(3.77) (15.18,30.27)	29.96(3.49) (22.99,36.94)

Table 15: Parameter estimates with standard error and interval estimate for MGV (TTE)

Water potential (MPa)	Parameters estimates	15°C	20°C	25°C	30°C	35°C
	b			-12.096(0.95) (-14.00,-10.19)		
0	*d*	0.94(0.03) (0.87,1.01)	0.98(0.04) (0.91,1.06)	0.82(0.05) (0.71,0.93)	0.98(0.02) (0.94,1.02)	0.94(0.03) (0.88,1.01)
	e	97.49(2.12) (93.24,101.73)	65.14(1.48) (62.19,68.09)	45.77(1.20) (43.37,48.18)	34.63(0.84) (32.95,36.31)	36.62(0.88) (34.86,38.38)
	b			-10.57(1.01) (-12.59,-8.55)		
-0.3	*d*	0.95(0.05) (0.85,1.04)	1.03(0.09) (0.86,1.20)	0.90(0.05) (0.81,0.99)	0.98(0.03) (0.91,1.05)	0.90(0.03) (0.85,0.96)
	e	28.24(2.57) (23.09,33.39)	44.38(2.03) (40.33,48.44)	38.43(1.23) (35.96,40.89)	19.60(0.87) (17.86,21.34)	17.74(1.09) (15.56,19.93)
	b			-9.67(0.79) (-11.24,-8.10)		
-0.5	*d*	0.97(0.03) (0.91,1.02)	1.02(0.04) (0.94,1.10)	0.92(0.05) (0.83,1.02)	0.90(0.02) (0.85,0.94)	0.89(0.03) (0.84,0.94)
	e	43.94(2.37) (39.20,48.68)	30.91(1.35) (28.21,33.60)	38.85(1.30) (36.25,41.46)	26.93(1.18) (24.56,29.29)	19.91(0.97) (17.97,21.85)
	b			-10.24(1.11) (-12.46,-8.02)		

-0.7	*d*	0.86(0.03) (0.81,0.91)	0.95(0.03) (0.89,1.01)	0.97(0.03) (0.90,1.03)	0.52(0.02) (0.48,0.57)	0.60(0.04) (0.51,0.68)
	e	56.40(3.39) (49.61, 63.18)	25.26(1.76) (21.74,28.77)	26.31(1.39) (23.52,29.09)	19.86(2.24) (15.38,24.34)	14.80(2.28) (10.25,19.35)
-1	*b*			-7.63(1.83) (-11.29,-3.98)		
	d	0.04(0.14) (-0.24,0.32)	0.66(0.03) (0.60,0.73)	0.49(0.03) (0.43,0.55)	0.67(0.03) (0.60,0.74)	0.34(0.04) (0.26,0.42)
	e	236.44(322.83) (-409.21,882.10)	132.24(5.19) (121.85,142.63)	95.65(4.50) (86.65,104.65)	79.84(2.99) (73.87,85.81)	71.16(5.33) (60.49,81.82)

Table 16: Parameter estimates with standard error and interval estimate for LGV (TTE)

Water potential (MPa)	Parameters estimates	15℃	20℃	25℃	30℃	35℃
0	*b*			-7.99(0.48) (-8.94,-7.04)		
	d	0.91(0.03) (0.85,0.97)	1(0.02) (0.96,1.04)	0.91(0.02) (0.87,0.95)	0.88(0.03) (0.82,0.94)	0.9(0.03) (0.84,0.96)
	e	36.95(1.99) (29.52, 44.38)	24.06(0.93) (19.85,28.26)	29.87(1.03) (26.33,33.42)	22.46(0.93) (19.40,25.53)	21.15(1.05) (18.13,24.18)
-0.3	*b*			-9.39(0.64) (-10.67,-8.11)		
	d	1.00(0.03) (0.93,1.06)	0.99(0.02) (0.95,1.04)	0.77(0.06) (0.65,0.90)	0.88(0.05) (0.79,0.97)	0.94(0.03) (0.88,1.01)
	e	40.48(3.87) (32.74, 48.22)	28.48(2.08) (24.32,32.64)	38.09(2.01) (34.08,42.11)	23.21(1.85) (19.52,26.90)	34.48(1.39) (31.70,37.27)
-0.5	*b*			-8.36(0.56) (-9.48,-7.23)		
	d	0.94(0.04) (0.86,1.02)	0.98(0.02) (0.94,1.02)	0.78(0.06) (0.66,0.91)	0.76(0.06) (0.64,0.88)	0.72(0.06) (0.60,0.85)
	e	57.07(4.72) (47.64,66.51)	24.01(2.52) (18.98,29.04)	38.90(2.16) (34.57,43.23)	28.70(2.40) (23.91,33.49)	15.56(2.04) (11.47,19.65)
-0.7	*b*			-8.20(0.60) (-9.39,-7.00)		
	d	0.82(0.02) (0.78,0.86)	0.96(0.02) (0.93,0.99)	0.85(0.03) (0.79,0.90)	0.47(0.02) (0.43,0.51)	0.56(0.03) (0.49,0.62)
	e	57.93(3.30) (51.33, 64.52)	48.70(1.51) (45.67,51.72)	30.09(1.51) (27.07,33.11)	36.12(2.67) (30.78,41.45)	20.98(2.31) (16.36,25.60)
	b			-9.35(0.90) (-11.15,-7.55)		
		0.06(0.06)	0.74(0.06)	0.42(0.07)	0.55(0.07)	0.40(0.08)

-1	*d*	(-0.05,0.17)	(0.62,0.87)	(0.28,0.56)	(0.40,0.69)	(0.24,0.56)
	e	88.27(75.62) (-62.98 ,36.37)	45.17(4.68) (35.81,239.51)	15.23(3.39) (8.45,54.53)	37.16(2.65) (31.86,22.01)	28.80(3.78) (21.24,42.47)

Table 17: Parameter estimates with standard error and interval estimate for: EGV (NLR)

Water potential (MPa)	Parameters estimates	15℃	20℃	25℃	30℃	35℃
0	*b*			-3.774(0.30) (-4.37,-3.18)		
	d	0.94(0.04) (0.86, 1.02)	1.00(0.09) (0.82, 1.18)	1.00(0.26) (0.48, 1.52)	0.97(0.03) (0.91, 1.03)	1.00(0.05) (0.90, 1.10)
	e	49.56(3.61)	22.47(1.54) (19.40, 25.54)	30.15(7.81) (14.54, 45.76)	16.83(1.28) (14.26, 19.40)	29.68(2.34) (25.01, 34.35)
-0.3	*b*			-3.746(0.54) (-4.82,-2.67)		
	d	0.96(0.03) (0.89, 1.03)	1.00(0.07) (0.87, 1.13)	1.00(0.04) (0.93, 1.07)	0.84(0.06) (0.72, 0.96)	0.92(0.05) (0.82, 1.02)
	e	53.53(3.85) (45.82, 61.24)	45.76(3.82) (38.13, 53.39)	25.24(1.88) (21.47, 29.01)	21.58(1.75) (18.09, 25.07)	20.02(6.16) (7.71, 32.33)
-0.5	*b*			-3.0173(0.20) (-3.42,-2.61)		
	d	1.00(0.04) (0.93, 1.07)	1.00(0.03) (0.94, 1.06)	1.00(0.05) (0.91, 1.09)	0.91(0.06) (0.79, 1.03)	0.90(0.04) (0.82, 0.98)
	e	42.17(3.91) (34.34, 50.00)	27.15(2.43) (22.29, 32.01)	25.04(2.40) (20.24, 29.84)	30.88(3.08) (24.72, 37.04)	20.59(1.15) (18.28, 22.90)
-0.7	*b*			-2.47(0.21) (-2.89,-2.05)		
	d	0.98(0.04) (0.91, 1.05)	0.85(0.05) (0.75, 0.95)	0.82(0.08) (0.66, 0.98)	0.71(0.08) (0.56, 0.86)	0.91(0.05) (0.81, 1.01)
	e	56.17(6.07) (44.02, 68.32)	32.11(3.58) (24.96, 39.26)	30.24(4.13) (21.97, 38.51)	22.26(3.14) (15.98, 28.54)	14.49(1.69) (11.10, 17.88)
-1	*b*			-2.29(0.26) (-2.80,-1.78)		
	d	0.47(0.09) (0.29, 0.65)	0.83(0.27) (0.29, 1.37)	0.61(0.08) (0.45, 0.77)	0.52(0.09) (0.33, 0.71)	0.43(0.10) (0.22, 0.64)
	e	230.99(17.95) (195.09,266.89)	104.55(11.48) (81.58, 127.52)	95(4.47) (86.05, 103.95)	83(5.04) (72.93, 93.07)	67.9(9.45) (49.01, 86.79)

Table 18: Parameter estimates with standard error and interval estimate for MGV (NLR)

Water potential (MPa)	Parameters estimates	15℃	20℃	25℃	30℃	35℃
0	*b*			-4.07(0.30) (-4.39,-3.75)		
	d	0.97(0.16) (0.79, 1.15)	0.98(0.09) (0.46, 1.50)	0.85(0.26) (0.79, 0.91)	0.99(0.03) (0.89, 1.09)	1.00(0.05) (-6.25,8.25)
	e	57.68(3.63) (54.61, 60.75)	16.32(1.54) (0.71, 31.93)	21.56(7.80) (18.99, 24.13)	10.64(1.28) (5.97, 15.31)	25.75(2.34) (25.15, 26.35)
-0.3	*b*			-3.75(0.33) (-4.42,-3.08)		
	d	0.92(0.04) (0.84, 1.00)	1.00(0.13) (0.75, 1.25)	1.00(0.10) (0.80, 1.20)	0.99(0.03) (0.93, 1.05)	0.95(0.03) (0.88, 1.02)
	e	15.31(1.32) (12.68, 17.94)	43.16(4.64) (33.88, 52.44)	39.61(3.88) (31.85, 47.37)	18.92(1.46) (16.00, 21.84)	18.32(1.39) (15.53, 21.11)
	b			-3.82(0.32) (-4.45,-3.19)		

-0.5	*d*	0.99(0.07) (0.84, 1.14)	1.00(0.21) (0.57, 1.43)	1.00(0.13) (0.73, 1.27)	0.97(0.10) (0.78, 1.16)	0.92(0.08) (0.76, 1.08)
	e	44.54(6.72) (31.10, 57.98)	29.96(14.64) (0.68, 59.24)	39.25(12.94) (13.38, 65.12)	28.17(6.84) (14.50, 41.84)	19.77(2.87) (14.04, 25.50)
-0.7	*b*			-2.22(0.11) (-2.44,-2.00)		
	d	1.00(0.05) (0.90, 1.10)	1.00(0.05) (0.90, 1.10)	1.00(0.07) (0.86, 1.14)	0.75(0.09) (0.57, 0.93)	0.72(0.09) (0.54, 0.90)
	e	70.36(8.98) (52.41, 88.31)	26.04(1.26) (23.52, 28.56)	27.40(1.92) (23.57, 31.23)	36.62(4.59) (27.44, 45.80)	17.66(2.60) (12.46, 22.86)
-1	*b*			-1.36(0.12) (-1.60,-1.12)		
	d	0.05(0.04) (-0.02,0.12)	0.8(0.09) (0.62, 0.98)	0.64(0.08) (0.48, 0.80)	0.89(0.33) (0.22, 1.56)	0.39(0.10) (0.19, 0.59)
	e	221(33.77) (153.46, 288.54)	137(7.83) (121.34,152.66)	99(7.83) (83.34, 114.66)	88(5.50) (77.00, 99.00)	77.93(10.35) (57.23, 98.63)

Table 19: Parameter estimates with standard error and interval estimate for LGV (NLR)

Water potential (MPa)	Parameters estimates	15℃	20℃	25℃	30℃	35℃
0	b			-3.84(0.28) (-4.40,-3.28)		
	d	0.90(0.05) (0.80,1.00)	1.00(0.02) (0.97, 1.03)	0.95(0.04) (0.87, 1.03)	0.93(0.05) (0.84, 1.02)	0.95(0.04) (0.86, 1.04)
	e	31.56(2.45) (26.66,36.46)	24.76(1.68) (21.40, 28.12)	28.43(2.17) (24.10, 32.76)	20.31(1.58) (17.15, 23.47)	19.51(1.51) (16.49, 22.53)
-0.3	b			-2.69(0.20) (-3.09,-2.29)		
	d	1.00(0.03) (0.94,1.06)	0.99(0.05) (0.89, 1.09)	1.00(0.12) (0.76, 1.24)	0.89(0.05) (0.79, 0.99)	1.00(0.04) (0.92, 1.08)
	e	23.53(2.65) (18.24,28.82)	28.52(2.88) (22.75, 34.29)	44.95(6.48) (32.00, 57.90)	24.00(2.11) (19.77, 28.23)	22.04(1.84) (18.36, 25.72)
-0.5	b			-2.56(0.21) (-2.98,-2.14)		
	d	1.00(0.05) (0.89, 1.11)	1.00(0.02) (0.95, 1.05)	1.00(0.12) (0.76, 1.24)	0.79(0.06) (0.67, 0.91)	0.77(0.06) (0.64, 0.90)
	e	56.70(6.48) (43.73,69.67)	22.63(2.32) (17.99,27.27)	43.80(6.54) (30.73,56.87)	29.85(3.33) (23.19,36.51)	16.19(1.97) (12.24, 20.14)
-0.7	b			-2.37(0.21) (-2.78,-1.96)		
	d	0.95(0.05) (0.84, 1.06)	1.00(0.02) (0.95, 1.05)	0.91(0.06) (0.79, 1.03)	0.64(0.07) (0.49, 0.79)	0.65(0.08) (0.49, 0.81)
	e	70.56(8.55) (53.45, 87.67)	50.29(5.52) (39.25, 61.33)	31.25(6.39) (18.47, 44.03)	45.90(6.52) (32.85, 58.95)	22.62(3.53) (15.56, 29.68)
-1	b			-2.07(0.28) (-2.63,-1.51)		
	d	0.05(0.04) (-0.03, 0.13)	0.77(0.07) (0.63, 0.91)	0.44(0.44) (-0.44, 1.32)	0.57(0.10) (0.38, 0.76)	0.39(0.12) (0.15, 0.63)
	e	244.99(20.69) (203.60, 286.38)	140.99(6.83) (127.32, 154.66)	86.69(12.28) (62.12, 111.26)	72.84(8.03) (56.78, 88.90)	72.84(10.55) (51.73, 93.95)

Table 20: Error sum of square by performance of TTE and NLR for EGV

	0%WP		**-0.3%WP**		**-0.5%WP**		**-0.7%WP**		**-1WP%**	
	TTE	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**
15℃	0.0693	0.03201	0.00831	0.0145	1.98E-02	0.0049	3.0E-02	0.000	3.60E-03	0.0039
20℃	0.0520	0.00731	0.00257	0.0351	3.99E-03	0.0290	2.5E-02	0.027	1.22E-02	0.0547
25℃	0.0105	0.02208	0.01016	0.0080	6.98E-03	0.0181	1.7E-02	0.017	1.97E-02	0.0258

30℃	0.0134	0.01623	0.00043	0.0001	1.09E-02	0.0006	2.0E-03	0.002	3.86E-03	0.0044
35℃	0.0053	0.00594	0.00764	0.0074	3.39E-03	0.0022	1.0E-03	0.000	3.84E-03	0.0037

Table 21: Error sum of square by performance of TTE and NLR for MGV

	0%WP		**-0.3%WP**		**-0.5%WP**		**-0.7%WP**		**-1WP%**	
	TTE	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**
15℃	9.38E-03	0.0869	0.00045	0.0206	0.00291	0.0059	0.0097	0.030	0.0002	0.0005
20℃	1.78E-02	0.0039	0.00069	0.0256	0.00365	0.0025	0.0264	0.015	0.0086	0.0072
25℃	5.24E-04	0.0006	0.00581	0.0138	0.00414	0.0246	0.0157	0.073	0.0213	0.0419
30℃	7.81E-04	0.0002	0.00744	0.0166	0.01596	0.0049	0.0169	0.130	0.0426	0.0519
35℃	1.85E-03	0.0163	0.00452	0.0027	0.00504	0.0051	0.0053	0.002	0.0009	0.0172

Table 22: Error sum of square by performance of TTE and NLR for LGV

	0%WP		**-0.3%WP**		**-0.5%WP**		**-0.7%WP**		**-1WP%**	
	TTE	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**	**TTE**	**NLR**
15℃	0.02354	9.938E-05	0.0016	0.0333	1.07E-02	0.0118	1.1E-02	0.0194	3.92E-04	0.0015
20℃	0.02803	8.925E-03	0.0070	0.0246	5.22E-03	0.0008	5.7E-03	0.0534	3.02E-02	0.0129
25℃	0.00662	6.296E-03	0.0014	0.0157	6.17E-03	0.0401	8.8E-03	0.0125	2.02E-03	0.0011
30℃	0.01577	3.192E-03	0.0120	0.0159	1.41E-02	0.0077	1.5E-02	0.0533	3.94E-03	0.0386
35℃	0.00431	5.399E-04	0.0046	0.0122	2.04E-02	0.0253	5.8E-03	0.0051	2.22E-03	0.0163

Table 23. MTG and MG % under 0 MPa using TTE

	EGV				**MGV**				**LGV**			
	MTG (hours)		**MG (%)**		**MTG (hours)**		**MG (%)**		**MTG (hours)**		**MG (%)**	
	Obs.	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**
15 ℃	96-120	109	92	91	96-120	97	94	94	96-120	116	88	91
20 ℃	60-72	72	100	100	60-72	65	94	98	60-72	71	100	99
25 ℃	48-60	54	100	97	36-48	45	82	82	48-60	52	94	91
30 ℃	36-48	39	96	91	36-48	34	98	98	36-48	44	90	88
35 ℃	36-48	40	96	91	36-48	36	94	94	36-48	43	92	90

Table 24. MTG and MG % under -0.3 MPa using TTE

	EGV				**MGV**				**LGV**			
	MTG (hours)		**MG (%)**		**MTG (hours)**		**MG (%)**		**MTG (hours)**		**MG (%)**	
	Obs.	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**
15 ℃	120-144	139	94	98	120-144	124	90	94	120-144	124	90	94
20 ℃	72-84	83	98	100	72-84	80	90	100	72-84	80	90	100
25 ℃	36-48	48	100	97	48-60	50	92	90	48-60	50	92	90
30 ℃	36-48	46	82	80	36-48	43	96	97	36-48	43	96	97
35 ℃	36-48	43	90	86	36-48	41	94	90	36-48	41	94	90

Table 25. MTG and MG % under -0.5 MPa using TTE

	EGV				**MGV**				**LGV**			
	MTG (hours)		**MG (%)**		**MTG (hours)**		**MG (%)**		**MTG (hours)**		**MG (%)**	
	Obs.	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**
15 ℃	144-168	152	92	94	144-168	159	94	86	168-192	186	88	81
20 ℃	84-96	96	82	81	72-84	87	98	94	96-120	97	98	95
25 ℃	72-84	77	70	71	72-84	74	94	96	72-84	78	84	84
30 ℃	60-72	58	64	65	72-84	60	60	52	72-84	74	52	47

35 °C	48-60	51	88	89	60-72	53	64	59	72-84	58	58	55

Table 26. MTG and MG % under -0.7 MPa using TTE

	EGV				**MGV**				**LGV**			
	MTG (hours)		**MG (%)**		**MTG (hours)**		**MG (%)**		**MTG (hours)**		**MG (%)**	
	Obs.	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**
15 °C	216-240	229	42	47	264-286	236.44	4	4	286-310	304	4	5
20 °C	96-120	104	78	83	120-144	132.23	70	66	144-168	141	74	77
25 °C	84-96	94	56	61	84-96	95.64	50	49	84-96	87	42	44
30 °C	72-84	82	48	52	72-84	79.83	84	67	84-96	73	54	57
35 °C	60-72	65	38	43	72-84	71.15	34	34	72-84	77	36	57

Table 27. MTG and MG % under -1 MPa using TTE

	EGV				**MGV**				**LGV**			
	MTG (hours)		**MG (%)**		**MTG (hours)**		**MG (%)**		**MTG (hours)**		**MG (%)**	
	Obs.	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**	**Obs.**	**Theo.**
15 °C	216-240	229	42	47	264-286	236.44	4	5	286-310	304	4	5
20 °C	96-120	104	78	83	120-144	132.23	70	80	144-168	141	74	77
25 °C	144-168	94	56	61	84-96	95.64	50	64	84-96	87	42	44
30 °C	72-84	82	48	52	168-192	79.83	84	89	84-96	73	54	57
35 °C	60-72	65	38	43	72-84	71.15	34	39	72-84	77	36	57

Table 28. Theoretical range of favourable temperatures required to obtain maximum germination under different moisture conditions in three maturity group of varieties using TTE and NLR** models

Variety	**0 MPa**	**-0.3 MPa**	**-0.5 MPa**	**-0.7 MPa**	**-1 MPa**
EGV	20-25 (35)	* (25)	25 (25)	35(35)	20-25(20-25)
MGV	30-35 (35)	* (30)	*(25-30)	25(25)	30 (30)
LGV	20-25 (20)	15-20 (15)	20 (20)	15-20 (15-20)	20 (20)

* appearing in the table could not represent a valid favourable temperature under TTE model

**values in bracket are based on NLR model

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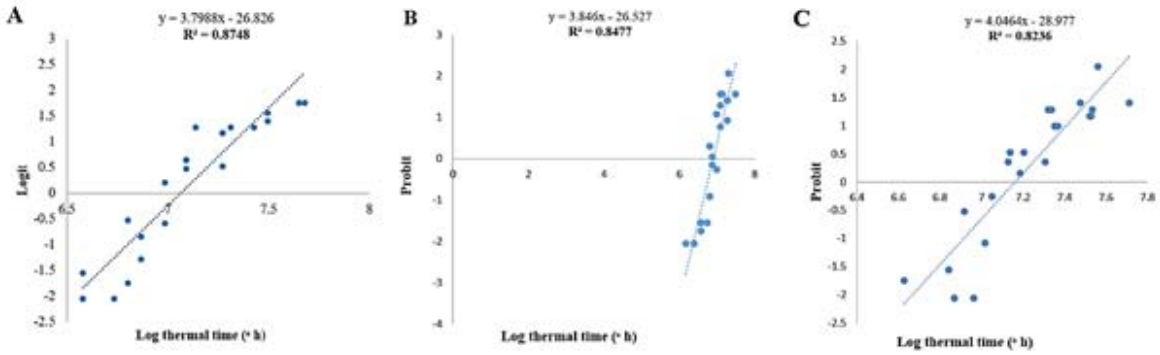

Fig 1: A: Regression of thermal time (Logit) of EGV, **B:** Regression of thermal time (Probit) of MGV, **C:** Regression of thermal time (Probit) of LGV.

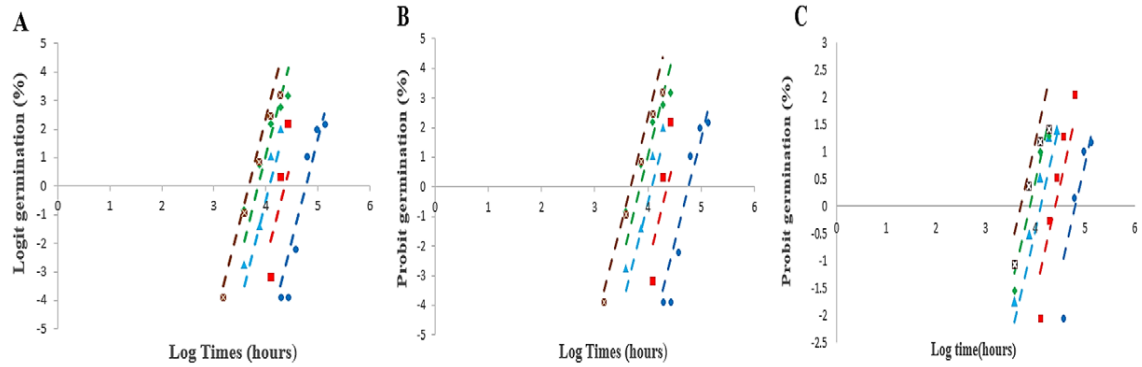

Fig 2: A: Temperature-wise fitted logit value of EGV, **B:** Temperature-wise fitted probit value of MGV and **C:** Temperature-wise fitted probit value of LGV. Dotted lines indicate fitted values (Blue dotted line at 15℃, red line at 20℃, sky blue at 25℃, green at 30℃, and brown at 35℃) and the corresponding symbols are observed values.

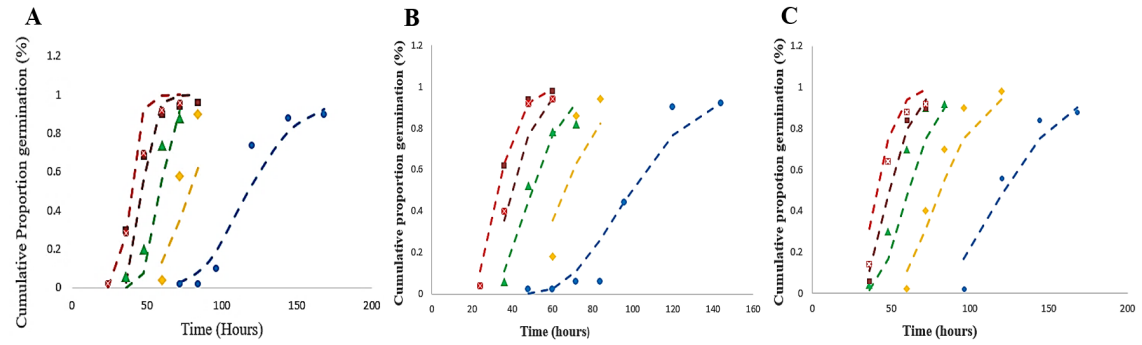

Fig 3: A: Germination time course of EGV (Logit), **B:** Germination time course of MGV and **C:** Germination time course (Probit) of LGV at different range of temperatures. Dotted lines indicate theoretical values (blue dotted line at 15℃, yellow at 20℃, green at 25℃, brown at 30℃, and red at 35℃) and the corresponding symbols are observed values.

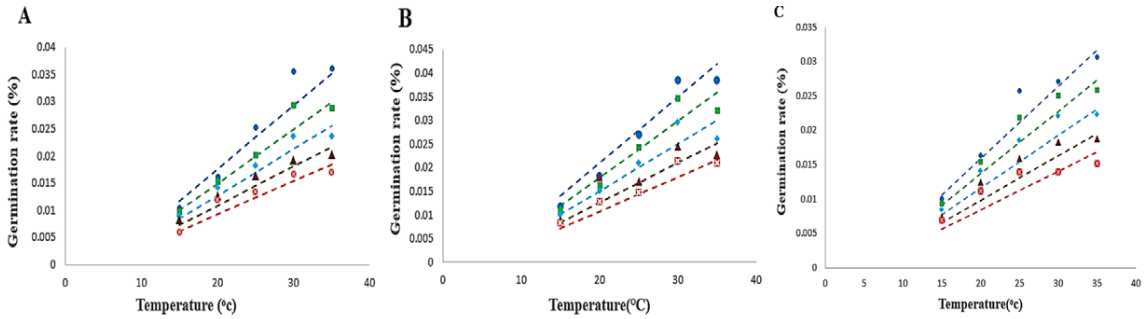

Fig 4: **A:** Predicted rate of germination (Logit) of EGV, **B:** Predicted rate of germination (Probit) of MGV and **C:** Predicted rate of germination (Probit) of LGV at different fractions of germination (0.1, 0.25, 0.5, 0.75, 0.9 %) shown as coloured lines. Dotted lines indicate theoretical values (blue dotted line at 0.1%, green at 0.25%, sky blue at 0.5%, brown at 0.75%, and red at 0.9%) and the corresponding symbols are observed values.

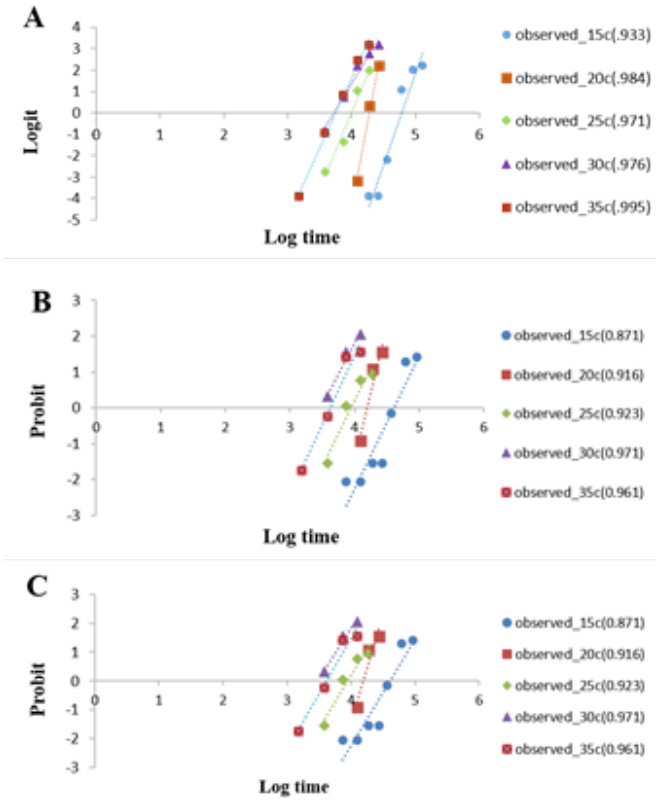

Fig 5: **A:** Logit vs. logtime regression of EGV, **B:** Probit vs. logtime regression of MGV and **C:** Probit vs. logtime regression of LGV.

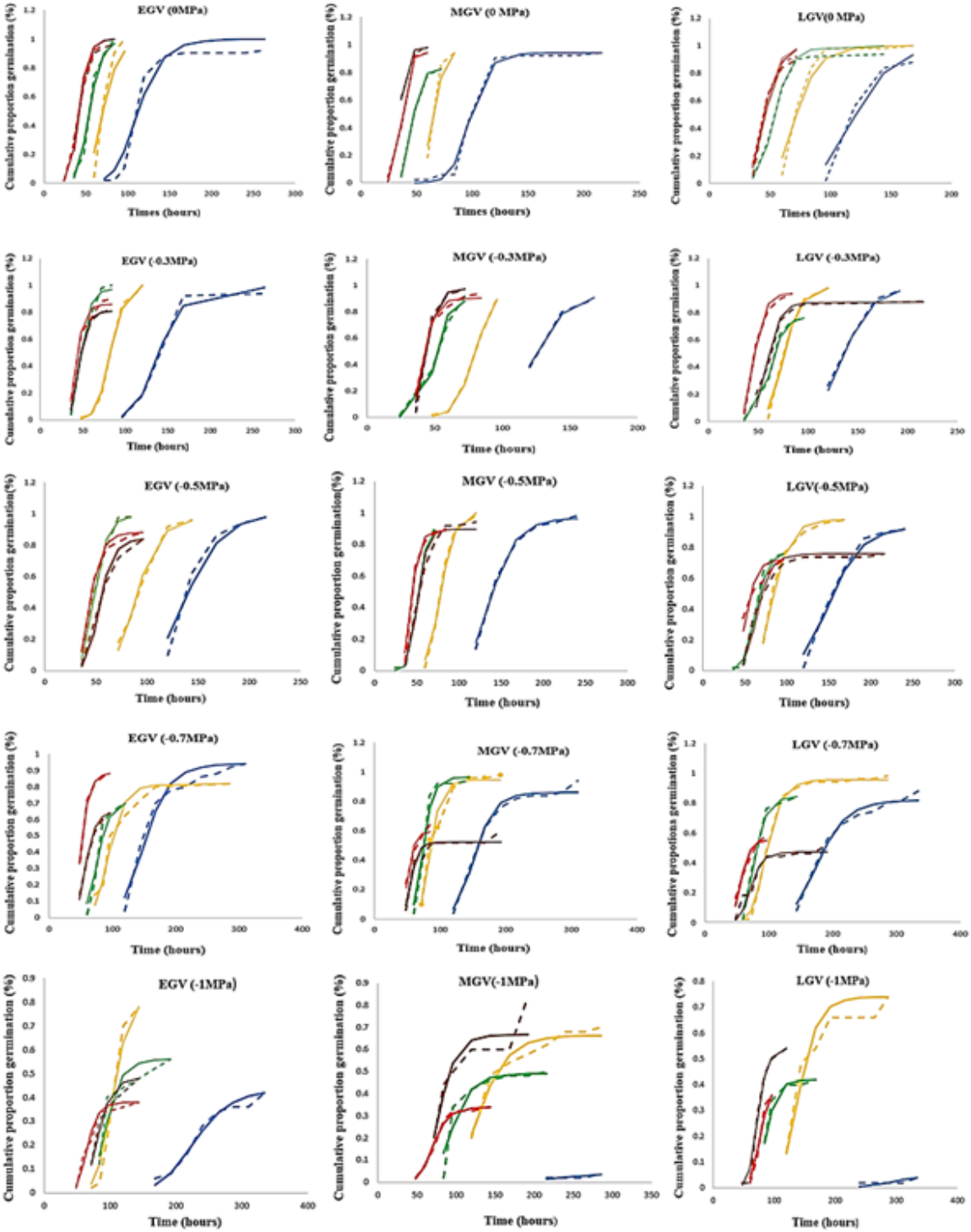

Fig 6: Germination time course of three maturity groups of rice varieties (EGV, MGV, and LGV) seeds for all temperatures (15,20,25,30, 35 ℃) under different water potentials (0, -0.3, -0.5, -0.7, -1 MPa). Solid lines are theoretical values and dotted lines are observed values of cumulative proportion of germination by TTE model. The cumulative proportion of germination was obtained, shown by different coloured lines in graph (Blue line at 15℃, orange line at 20℃, green line at 25℃, brown line at 30℃, and red line at 35℃).

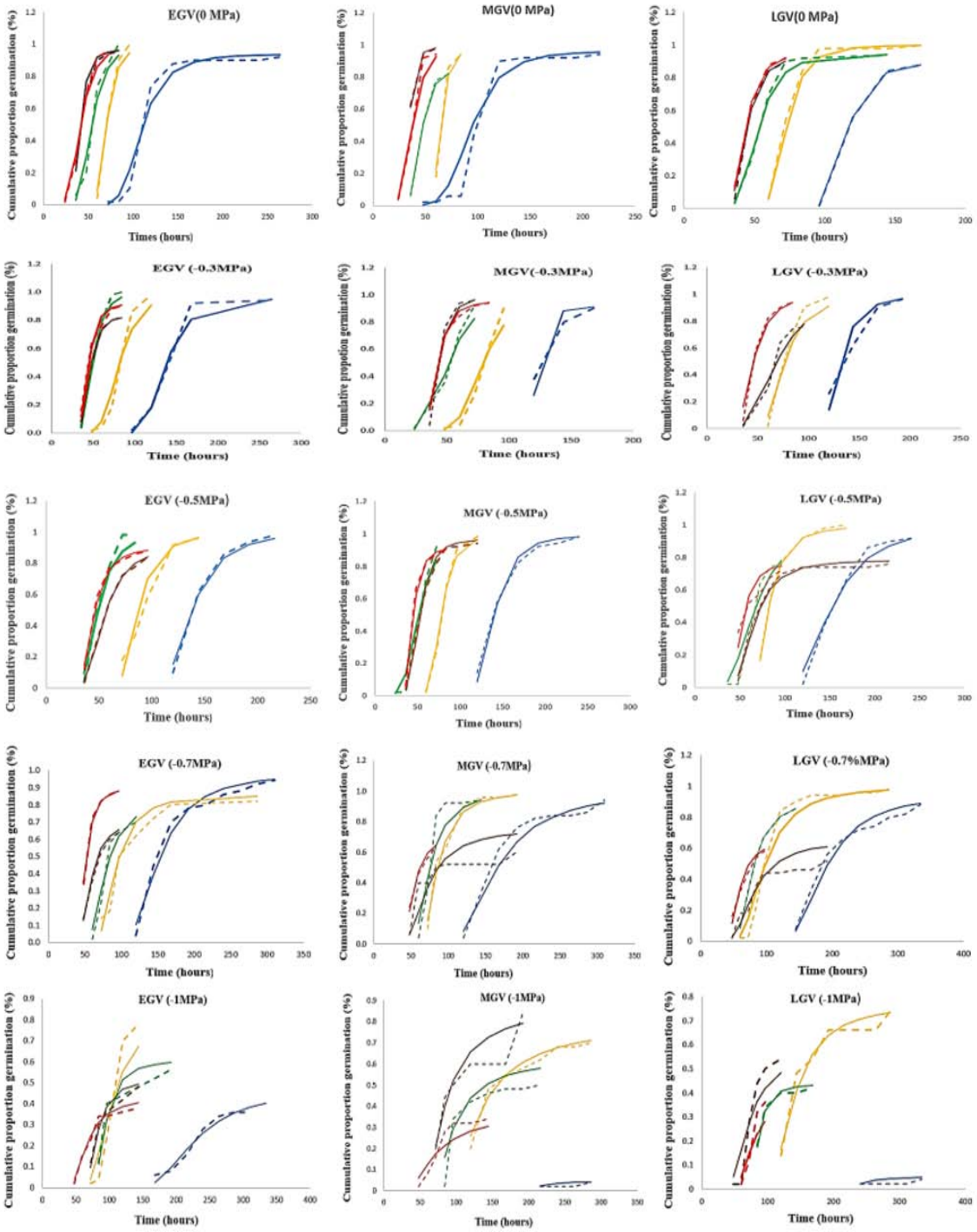

Fig 7: Germination time course of three maturity groups of rice varieties (EGV, MGV, and LGV) seeds for all temperatures (15, 20, 25, 30, 35 ℃) and under different water potentials (0, -0.3, -0.5, -0.7, -1 MPa). Solid lines are theoretical values and dotted lines are observed values of cumulative proportion of germination by NLR model. The cumulative proportion of germination was obtained, shown by different coloured lines in graph (Blue line at 15℃, orange line at 20℃, green line at 25℃, brown line at 30℃, and red line at 35℃).