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Research Note

Selection parameters for downy mildew disease, fruit yield and related traits in ridge gourd [*Luffa acutangula* (Roxb.) L.]

Anand Narasannavar[1]*, V. Devappa[1], M. Pitchaimuthu[2] B. Fhakrudin[3], H.B. Lingaiah[4], M. Anjanappa[1] and S. Sriram[5]
[1]Department of Vegetable Science, College of Horticulture, UHS campus, Bengaluru, Karnataka
[2]Principal Scientist, Division of Vegetable Science, IIHR, Bengaluru, Karnataka
[3]Department of Biotechnology and Crop Improvement, College of Horticulture, UHS Campus, Bengaluru, Karnataka
[4]Director of Education, University of Horticultural Sciences, Bagalkot, Karanataka
[5]Principal Scientist, Division of Plant Pathology, IIHR, Bengaluru, Karnataka
E-mail: anand046@gmail.com

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Abstract
Forty one genotypes of ridge gourd were evaluated in augmented design with three checks. Analysis of variance revealed significant differences among genotypes for all the traits. High PCV, GCV, heritability, genetic advance were observed for number of branches at 45 and 90 DAS, nodes up to first pistillate flower appearance, number of fruits per vine, average fruit weight, fruit length, fruit yield per vine, Per cent Disease Index (PDI) for downy mildew at 45, 60 and 75 DAS and fruit fly incidence. Positive and significant association was observed for fruit yield per vine with vine length at 45 and 90 DAS, number of branches at 45 and 90 DAS number of fruits per vine, fruit length. Fruit yield per vine was negative and significantly associated with days to first male flowering, nodes up to first female flowering, days to first harvest, flesh thickness, days to first appearance of downy mildew symptoms and per cent disease index for downy mildew. In open field screening for downy mildew has led to identification of two resistant genotypes (COHRG-9 and COHB-32), two moderately resistant lines (COHB-10 and COHB-40) and one was highly susceptible (COHB-8) whereas remaining genotypes were exhibited moderately susceptible and susceptible reaction to downy mildew in ridge gourd.

Key words
Ridge gourd, genetic variability, correlation, fruit yield, downy mildew.

Ridge gourd (*Luffa acutangula* (Roxb.) L., Cucurbitaceae, 2n = 26), a monoecious gourd is one of the fruit vegetables consumed and relished by most local people in India. Ridge gourd fruits have high medicinal value and contains a good amount of fiber, vitamins and minerals including carotene, niacin, calcium, phosphorus, iron, small quantities of iodine, fluorine and form a low calorie diet which is considered good for diabetes besides it has diuretic, expectorant and hypoglycemic properties. Since the ridge gourd is low in saturated fat and cholesterol; it is the ideal diet for those who are looking for weight loss. The ridge gourd juice is a very good natural remedy for the treatment of jaundice and helpful in the purification, restoration and nourishment of the liver and is also helpful in the liver detoxification resulting from alcohol intoxication. Ridge gourd has certain peptides which are exactly like insulin, alkaloids and charantin chemicals which help in reducing the blood sugar and urine sugar levels (Pullaiah, 2006). Despite its health and dietary benefits, the production of ridge gourd in India is mostly done on a small scale for local consumption and hence exact area and production are unknown. A large number of ridge gourd accessions are cultivated in southern region of India but no serious attempts have been made to improve them for higher productivity, acceptability in market and resistant to major diseases. Therefore, there is a need to improve the productivity and resistant to major diseases to meet the nutritional and dietary need of the people in particular the rural populations who are among the poorest and most vulnerable to malnutrition and poverty. The success of any crop improvement programme depends to a large extent on the amount of genetic variability present in the population. So, intensive research efforts are needed in several areas particularly in selection of superior ridge gourd genotypes with resistant to major diseases. The breeding programmes depend on the knowledge of key traits, their inheritance, genetic and the environmental factors that influence their expression. For rational approach towards the improvement of yield, selection has to be made for the components of yield, since, there may not be genes for yield *per se*, but only for various yield components (Grafius, 1959). Many of these yield contributing characters are interacted in desirable and undesirable direction. Hence, knowledge of association between the traits can greatly help in avoiding the inversely related compensation effects during selection.

The present research was carried out in Department of Vegetable Science, College of Horticulture Science-Bengaluru, University of Horticultural Sciences-Bagalkot, India. Two sets of seeds were separately sown for the evaluation of both downy mildew and yield parameters in augmented design. Sowing was done on 1.2 meters apart from ridges and 90 cm between the plants. All the recommended cultivation practices were followed to raise good crop (Anon., 2013b). A row consisting of 15 plants formed in each plot under each treatment. These 41 genotypes including resistance check (Deepthi) and susceptible checks (Pusa Nutan and Pusa Nasdar) were subjected to natural field conditions. Symptoms of downy mildew were recorded 45, 60, 75 and 90 days after sowing, as per the scale (0-5 scale) suggested by Singh *et al*. (1996) and Per cent Disease Index was calculated by using the formula.

$$PDI = \frac{\text{Sum of numerical ratings}}{\text{No.of leaves assessed} \times \text{maximum rating}} \times 100$$

The details of the scale are given below:

Grade of rating	Reaction	Disease intensity
0	Immune	-
1	Resistant	1-15
2	Moderately resistant	16-25
3	Moderately susceptible	26-50
4	Susceptible	51-75
5	Highly susceptible	Above 76

For yield and its associate parameters observations were recorded on five randomly selected plants of each genotype on vine length at 45 and 90 DAS, number of branches at 45 and 90 DAS, days to first female flowering, nodes up to first appearances of female flower, days to first harvest, number of fruits per vine, fruit length (cm), average fruit weight (g), fruit diameter (cm), flesh thickness (cm), rind thickness (mm), per cent disease index for downy mildew at 45, 60, 75 and 90 DAS and fruit fly incidence. Traits that differed significantly were further utilized for estimation of the genetic parameters. Statistical analysis was done by using Windostat Version 8.6 from indostat services, Hyderabad at Department of Genetics & Plant Breeding, UAS, GKVK, Campus Bengaluru.

Enormous genetic variations among the accessions are needed for effective and successful selection programme. Analysis of variance indicated significant differences among genotypes for all traits (Table 1). Sufficient genetic variability for many traits had been reported by Dubey *et al.* (2013), Khatoon, *et al.* (2016) and Hanumegowda (2011) in ridge gourd. Estimates of phenotypic coefficient of variation (PCV) were higher than that of the genotypic coefficient of variance (GCV) for all the characters studied and there was narrow difference between GCV and PCV (Table 2) implying that greater role was played by genotype rather than environment for expression of characters.

In the present investigation high GCV and PCV were observed as that of previous studies in ridge gourd for number of branches (Dubey *et al*. 2013; Choudhary and Kumar 2011), Nodes up to first female flowering (Khatoon *et al.,* 2016; Choudhary and Kumar 2011 and Choudhary *et al.* 2014), Number of fruits per vine (Khatoon *et al.,* 2016; Choudhary and Kumar 2011), average fruit weight (Choudhary and Kumar, 2011), fruit yield per vine (Kopaad *et al.* 2015; Khatoon *et al.,* 2016; Choudhary *et al.,* 2014 and Dubey *et al.,* 2013), per cent disease index for downy mildew and fruit fly infestation. It indicates existence of broad genetic base, which would be amenable for further selection.

Moderate GCV and PCV were observed for vine length at 45 DAS and 90 DAS, days to female flowering, fruit length, fruit diameter, flesh thickness, rind thickness and days to initiation of downy mildew symptoms. Similar results were also observed by Islam *et al*. (2009) in bitter gourd and Choudhary and Kumar (2011) in ridge gourd for vine length, Khatoon *et al.* (2016), Choudhary and Kumar (2011) in ridge gourd for days to first female flowering, moderate PCV and GCV was recorded by Koppad *et al.* (2015) in ridge gourd and Angadi (2015) in bitter gourd for fruit length, Khatoon *et al*. (2016) and Dubey *et al.* (2013) in ridge gourd, Islam *et al*. (2009) in bitter gourd for fruit diameter, Angadi (2015) for flesh thickness and rind thickness in bitter gourd. Moderate PCV and GCV for days to infection of downy mildew pathogen observed first time in this study.

Low PCV and GCV were observed for days to first harvest and results are in close conformity with that of Choudhary and Kumar (2011), Khatoon *et al*. (2016), Choudhary *et al.* (2014), Kumar *et al.* (2013) in sponge gourd.

Coefficient of variation indicates only the extent of variability present in germplasm for different characters, but for prediction of response to selection heritability estimates are useful. High broad sense of heritability (>90 %) was observed for vine length (Kumar *et al.,* 2013) in sponge gourd and Islam *et al* , 2009 in bitter gourd), number of branches (Kumar *et al.,* 2013) in sponge gourd, days to first male and female flowering (Islam *et al.,* 2009) in bitter gourd, days to first harvest (Dubey *et al.,* 2013) in ridge gourd, number of fruits per vine (Choudhary and Kumar, 2011; Khatoon *et al.* 2016; Dubey *et al.* 2013; in ridge gourd and Islam *et al.* 2009 in bitter gourd), days to initiation of downy mildew symptoms, per cent disease index for downy mildew and fruit fly incidence in ridge gourd.

High broad sense heritability (>80 %) was recorded for fruit length (Choudhary and Kumar, 2011; Choudhary *et al.,* 2014; Dubey *et al.,* 2013 in ridge gourd, Kumar *et al.,* 2013 in sponge gourd), flesh thickness (Angadi , 2015 in bitter gourd), Fruit yield per vine (Dubey *et al.,* 2011 in ridge gourd; Kumar *et al.,* 2013 in sponge gourd; Raja *et al.,* 2014; Dey *et al.,* 2014 and Dorica *et al.,* 2014 in bitter gourd).

Moderate broad sense heritability (40-80%) was observed for average fruit weight (Choudhry *et al.*, 2014, Dubey *et al.*, 2013; Khatoon *et al.*, 2016; Koppad *et al*., 2015 in ridge gourd), rind thickness (Koppad *et al.*, 2015 in ridge gourd).

Heritability in broad sense is not the true indicator of inheritance of traits, since; only additive component of genetic variance is efficiently transferred from generation to generation. Therefore, heritability in broad sense may mislead in judging the effectiveness of selection for the trait. Considering heritability in broad sense along with the genetic advance may reveal the prevalence of specific components (additive or non-additive) of genetic advance and thus helps in judging the effectiveness of selection for the trait more accurately. High heritability accompanied with high genetic advance indicates the prevalence of additive gene effects and hence, selection would be effective for such traits. The value of high genetic advance coupled with high estimates of heritability was observed for vine length, number of branches per vine, days to first female flowering, node to first female flowering, number of fruits per vine, average fruit weight, fruit length, flesh thickness, rind thickness, fruit yield per vine. These results were in agreement with Koppad *et al.* 2016, Khatoon *et al*. 2016 and Dubey *et al.* 2013 in ridge gourd. Whereas days to first initiation of downy mildew symptoms, per cent disease index for downy mildew were also reported high heritability coupled with high genetic advance in this study indicated the possibility of early and higher degree of downy mildew disease transformation for these traits through selection.

High heritability with moderate genetic advance over mean was observed for days to first harvest and fruit diameter. These results are in accordance with Kumar *et al.* 2013 and Khatoon *et al.* 2016 in sponge gourd. High heritability coupled with low or moderate GAM indicates the prevalence of non-additive components and need to be explore new genetic stock.

Positive and significant association was observed (Table 3) in the present investigation for fruit yield per vine with vine length at 45 and 90 DAS (Khatoon *et al.* 2016; Dubey *et al.* 2013 in ridge gourd), number of branches at 45 and 90 DAS (Hanumegowda 2011), number of fruits per vine (Dubey *et al.* 2013; Choudhary *et al.* 2014 in ridge gourd), fruit length (Choudhary *et al.* 2014; Choudhary and Kumar 2011in ridge gourd). Fruit yield per vine was negative and significantly associated with days to first male flowering (Khatoon *et al.* 2016; Choudhary *et al.* 2014 in ridge gourd), nodes up to first female flowering (Khatoon *et al.* 2016; Choudhary *et al.* 2014 in ridge gourd), days to first harvest (Khatoon *et al.* 2016; Choudhary *et al.* 2014 in ridge gourd and Dey *et al.* 2014 in bitter gourd), flesh thickness, days to first appearance of downy mildew symptoms and per cent disease index for downy mildew. Yield can be improved by selecting the genotypes having higher vine length, more number of branches, high fruit length and more number of fruits per vine. Early yielding genotypes can be obtained by selecting the genotypes having less number of days taken for anthesis of male and female flower, lower node at which pistillate flower appears and minimum days taken for first harvest. Days to first initiation of downy mildew disease and per cent disease index for downy mildew had negative and significant association on yield per plant, thus these traits could be avoided in selection of high yielding gentypes of ridge gourd.

In open field screening for downy mildew (Table 4) has led to identification of two resistant genotypes (COHRG-9 and COHB-32), two moderately resistant lines (COHB-10 and COHB-40) and one was highly susceptible (COHB-8) whereas remaining genotypes were exhibited moderately susceptible and susceptible reaction to downy mildew in ridge gourd. Similar results were also reported by Fugro *et al.* 1997; Varalakshmi *et al.* 2014; Jamadar and Desai, 1999; Thammaiah *et al.* 1999 in ridge gourd. These resistant sources are being incorporated in breeding programme for downy mildew resistance in ridge gourd.

Prevalence of degree of additive components of genetic variance and presence of high GCV and PCV for characters, number of braches per vine, nodes up to first female flowering, number of fruits per vine, average fruit weight, fruit length, fruit yield per plant, per cent disease index for downy mildew and fruit fly incidence indicated the possibility of achieving higher degree of genetic improvement of these traits though selection using the existing germplasm stock at the centre. The moderate and low GCV and PCV for characters vine length, days to first female flowering, days to first harvest, fruit diameter, flesh thickness, rind thickness and days to initiation of downy mildew symptom indicated the search for new genetic stock. Correlation studies also revealed that yield can be improved by selecting the genotypes having higher vine length, more number of branches, high fruit length and more number of fruits per vine. Early yield can be obtained by selecting the genotypes having less number of days taken for anthesis of male and female flower, lower node at which pistillate flower arrears and minimum days taken for first harvest. The resistance source like to downy mildew *viz.*, COHRG-9 and COHB-32 and two moderately resistant lines COHB-10 and COHB-40 could be utilised as parent in hybridisation programme to incorporate the downy mildew disease resistance under the background of high yielding and good market quality.

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References

Angadi, A. 2015. Genetic variability, divergence, heterosis and genetics of growth, earliness, yield and quality parameters in bitter gourd (*Momordica charantia L*.). Ph.D. (Hort) thesis, University of Horticultural Sciences, Bagalkot.

Anonymous. 2013. Package of practices for horticulture crops (Kannada), University of Horticultural Sciences, Bagalkot, pp 103-104.

Choudhary, B.R. and Kumar, S. 2011. Genetic analysis in ridge gourd [*Luffa acutangula* (Roxb.) L.] under hot arid conditions. *Indian J. Arid Horticulture*, **6**(1-2): 55-58.

Choudhary, B.R., Kumar, S. and Sharma, S.K. 2014. Evaluation and correlation for growth, yield and quality traits of ridge gourd (*Luffa acutangula*) under arid conditions. *Indian J. Agric. Sci.,* **84**(4): 498-502.

Dey, S.S., Behara, T.K. and Kaur, C. 2014. Genetic variability in ascorbic acid and carotenoids content in Indian bitter gourd (*Momordica charentia* L.). *J. Maharashtra Agric. Univ.,* **35**(1): 163-165.

Dorica, B., Sorin, C. and Alexandra, F. 2014. The variability study of some quantitative traits in *Momordica charentia* L. Bulletin UASVM. *Horticulture,* **67**(1): 1846.

Dubey, R.K., Singh, V. and Upadhya, Y.G. 2013. Genetic variability and inter-relationship among some ridge gourd (*Luffa acutangula* L.) accessions under foot hills of Arunachal Pradesh. *Progressive Horticulture,* **45**(1): 191-197.

Fugro, P. A., Rajput, J. C. and Mandokhot, A.M. 1997. Sources of resistance to downy mildew in ridge gourd and chemical control. *Indian Phytopathologhy,* **50(**1): 125-126.

Grafius, J.E. 1959. Heterosis in barely. *Agronomy J.,* **51**: 551-554.

Hanumegowda. 2011. Genetic variability studies in ridge gourd [*Luffa acutangula* (L.). M. Sc. Thesis, University of Horticultural Sciences, Bagalkot.

Islam, M.R., Hossain, M.S., Bhuiyan, M.S.R., Husna, A. and Syed, M.A. 2009. Genetic variability and path-coefficient analysis of bitter gourd (*Momordica charantia* L.). *Int. J. Sustainable Agric.,* **1**(3): 53-57.

Jamadar, M.M. and Desai, S.A. 1999. Reaction of ridge gourd local cultivars against downy mildew caused by *Pseudoperonospora cubensis* (Berk. and Curt.) Rostow. *Karnataka J. Agric. Sci.,***12**(1-4): 204-205.

Khatoon, U., Dubey, R.K., Singh, V., Upadhyay, G. and Pandey, A.K. 2016. Selection parameters for fruit yield and related traits in [*Luffa acutangula* (Roxb.) L.]. *Bangladesh Journal Botany***, 45**(1): 75-84.

Koppad, S.B., Chavan, M.L., Jagadeesha, R.C., Rathod, V., Jayappa, J. and Koulagi, S. 2015. Genetic variation and correlations among the physiological growth attributing characters in ridge gourd (*Luffa acutangula* Roxb.) with reference to yield. *Int. J. Adv. Res.,* **3**(4): 961-971.

Kumar, R., Ameta, K.D., Dubey, R.B. and Pareek, S. 2013. Genetic variability, correlation and path analysis in sponge gourd (*Luffa cylindrica* Roem.). *African J. Biotech.,* **12**(6): 539-543.

Pullaiah, T. 2006. Encyclopedia of world medicinal plants. Daya books, Vol 2(1**)**: 271- 274.

Raja, S., Bagle, B.G. and Dhankar, D.G. 2007. Genetic variability studies in bitter gourd for zero integrated condition of semi arid ecosystem. *Indian journal of Horticulture*, **64**(4): 425-429.

Singh, P.P., Thind, T.S. and Tarsem, L. 1996. Reactions of some muskmelon genotypes against *Pseudoperonospora cubensis* under field and artificial epiphytotic conditions. *Indian Phytopathology***, 49**(2): 188-190.

Thammaiah, N., Reddy, B.S., Patil, R.V., Kulkarni, M.S. and Haralapur, S.L. 1999. Varietal screening of ridge gourd genotypes against downy mildew. *South Indian Horticulture*, **47(**1-6): 315-316.

Varalakshmi, B., Chowdappa, P., Krishnamurthy, D. and Manjunath, K.S. 2014. Reaction of ridge gourd advanced selections against downy mildew (*Pseudoperonospora cubensis*). *Book of Abstracts* (poster papers) of 6th Indian Horticulture Congress, Coimbatore., pp.102-103.

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Table 1. Analysis of variance (ANOVA) for growth, earliness, yield, downy mildew disease and fruit fly incidence in ridge gourd

Sl. No.	Source of variation	Mean sum of squares					
		Blocks	Entries	(a) Checks	(b) Varieties	(c) Checks vs. Varieties	Error
	Degrees of freedom	3	40	2	37	1	6
1	Vine length at 45 DAS (cm)	19.403	1737.084**	4612.583**	1627.441**	42.848	54.257
2	Vine length at 90 DAS (cm)	30.49	1773.440**	4026.410**	1679.860**	729.750**	33.900
3	Number of branches at 45 DAS	1.323	195.882**	10.282**	145.499**	40.102**	0.745
4	Number of branches at 90 DAS	2.977	459.770**	101.522**	309.079**	49.169**	1.598
5	Days to female flowering	1.23	45.087**	160.213**	36.652**	126.933**	1.347
6	Nodes up to first female flowering	1.03	8.270**	12.880**	7.530**	26.380**	2.710
7	Days to first harvesting	0.937	29.630**	58.643**	28.855**	0.256	1.110
8	Number of fruits per plant	0.402	17.108**	103.903**	12.877**	0.08	0.792
9	Average fruit weight (g)	871.776	2937.190*	18860.250**	2014.762*	5220.913*	461.695
10	Fruit length (cm)	1.235	49.032**	9.323	40.690**	437.078**	4.012
11	Fruit diameter (cm)	0.092	0.305*	1.068**	0.271*	0.046	0.060
12	Flesh thickness (cm)	0.01	0.135**	0.181**	0.136**	0.024	0.014
13	Rind thickness (mm)	0.306	0.558*	0.25	0.590*	0.014	0.139
14	Fruit yield per plant (kg)	0.042	0.353**	0.751**	0.330**	0.379*	0.035
15	Days to first infection by downy mildew pathogen	0.323	275.770**	3634.023**	82.477**	711.119**	2.578
16	Downy mildew PDI @45 DAS	2.126	232.828**	2909.723**	91.646**	102.778**	2.546
17	Downy mildew PDI @60 DAS	2.56	265.390**	3122.610**	118.090**	1.080*	3.600
18	Downy mildew PDI @ 75 DAS	5.75	301.009**	3654.123**	127.763**	4.858	3.165
19	Downy mildew PDI @ 90 DAS	4.259	311.266**	4087.457**	115.219**	12.591*	1.075
20	Fruit fly incidence (%)	3.702	285.209**	179.717**	271.035**	1020.657**	3.240

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Table 2. Estimates of mean, range, variance, coefficient of variation, heritability and genetic advance for different growth, earliness yield, downy mildew disease and fruit fly incidence in ridge gourd

Sl. No.	Traits	Mean	Range		Variance		Co-efficient of Variability		h^2 (broad sense) (%)	GA	GA as per cent mean
			Min.	Max.	PV	GV	PCV (%)	GCV (%)			
1	Vine length at 45 DAS (cm)	209.92	102.00	278.00	1319.64	1265.39	17.31	16.95	95.89	71.76	34.18
2	Vine length at 90 DAS9cm)	239.44	135.00	296.20	1357.83	1323.94	15.40	15.20	97.50	74.01	30.11
3	Number of branches at 45 DAS	6.09	2.80	11.00	3.19	3.06	29.30	28.72	96.10	3.53	57.99
4	Number of branches at 90 DAS	8.99	3.40	14.60	6.77	6.50	28.93	28.36	96.07	5.15	57.25
5	Days to female flowering	42.05	320	57.80	29.74	28.40	12.97	12.67	95.47	10.73	25.51
6	Nodes up to first female flowering	8.18	3.80	15.40	6.10	5.87	30.18	29.59	96.15	4.89	59.77
7	Days to first harvesting	54.68	45.80	66.60	23.43	22.32	8.86	8.64	95.26	9.50	17.37
8	Number of fruits per plant	9.06	3.20	15.60	10.51	9.72	35.79	34.41	92.46	6.18	68.16
9	Average fruit weight (g)	171.07	102.00	358.00	1710.90	1249.21	24.18	20.66	73.01	62.21	36.37
10	Fruit length (cm)	27.39	15.20	48.00	33.51	29.50	21.14	19.83	88.03	10.50	38.33
11	Fruit diameter (cm)	4.08	2.70	5.40	0.23	0.17	11.75	10.10	73.99	0.73	17.90
12	Flesh thickness (cm)	2.63	1.90	3.60	0.11	0.10	12.71	11.88	87.35	0.60	22.86
13	Rind thickness (mm)	4.29	3.00	6.00	0.50	0.36	16.51	14.04	73.29	1.05	24.59
14	Fruit yield per vine (kg)	1.41	0.60	2.60	0.27	0.24	37.10	34.61	87.04	0.94	66.51
15	Days to first initiation of downy mildew symptoms	43.99	35.40	87.60	66.84	64.27	18.59	18.22	96.14	16.19	36.81
16	Downy mildew PDI @45 DAS (%)	37.33	12.00	51.70	74.21	71.67	23.08	22.68	96.57	17.14	45.91
17	Downy mildew PDI @60 DAS (%)	44.04	13.10	65.10	95.69	92.08	22.21	21.79	96.23	19.39	44.03
18	Downy mildew PDI @ 75 DAS (%)	48.46	16.00	66.10	103.39	100.22	20.98	20.66	96.94	20.30	41.90
19	Downy mildew PDI @ 90 DAS (%)	51.95	18.10	67.30	92.89	91.81	18.55	18.44	98.84	19.62	37.77
20	Fruit fly incidence (%)	28.28	6.80	72.60	218.64	215.40	52.29	51.89	98.52	30.01	106.12

PV - Phenotypic variance GV - Genotypic variance h^2 - Heritability GA - Genetic Advance PCV - Phenotypic co-efficient of variability
GCV -Genotypic co-efficient of variability PDI-Per cent Disease Index

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Table 3. Correlation co-efficient among growth, earliness yield and downy mildew disease in ridge gourd

Traits	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
X1	1.000															
X2	0.949**	1.000														
X3	0.546**	0.603**	1.000													
X4	0.410**	0.417**	0.658**	1.000												
X5	0.138	0.118	-0.008	-0.064	1.000											
X6	-0.154	-0.207	-0.311*	-0.293*	0.362**	1.000										
X7	-0.140	-0.173	-0.126	-0.159	0.524**	0.418**	1.000									
X8	0.311*	0.333*	0.353*	0.464**	-0.321*	-0.533**	-0.485**	1.000								
X9	0.426**	0.380**	0.281*	0.105	0.142	0.166	0.088	0.085	1.000							
X10	0.257	0.213	-0.033	0.032	-0.239	0.209	-0.077	0.054	0.358*	1.000						
X11	0.035	0.063	0.048	0.040	-0.147	-0.046	-0.089	0.391**	0.432**	0.123	1.000					
X12	-0.316*	-0.285*	-0.356*	-0.277	0.103	0.309*	0.390**	-0.341*	0.156	0.000	0.312*	1.000				
X13	-0.050	0.017	-0.065	-0.059	-0.218	-0.171	-0.025	0.284*	0.078	0.057	0.373**	0.155	1.000			
X14	-0.202	-0.114	-0.139	-0.320*	0.248	0.340*	0.337*	-0.390**	-0.003	-0.204	0.072	0.312*	0.290*	1.000		
X15	-0.034	-0.155	0.089	0.309*	-0.355*	-0.388**	-0.375**	-0.336**	-0.115	-0.010	-0.155	-0.393**	-0.185	-0.758**	1.000	
X16	.0391**	0.419**	0.298*	0.336*	-0.290*	-0.297*	-0.512**	0.792**	0.190	0.299*	0.263	-0.350*	0.261	-0.297*	-0.392**	1.000

*, ** Significant at 5 and 1 per cent level, respectively

X1-Vine length at 45 DAS (cm)
X2- Vine length at 90 DAS (cm)
X3- Number of branches at 45 DAS
X4- Number of branches at 90 DAS
X5- Days to first female flowering
X6-Nodes up to first female flowering
X7- Days to first harvest
X8- Number of fruits per vine
X9- Average fruit weight (g)
X10- Fruit length (cm)
X11-Fruit diameter (cm)
X12- Flesh thickness (cm)
X13- Rind thickness (mm)
X14- Days to first initiation of downy mildew Symptoms
X15- Downy mildew per cent disease index
X16-Yield per vine (kg)

Table 4. Reaction of ridge gourd genotypes against *Psuedoperonospora cubensis* under natural epiphytotic condition

Grade of rating	Reaction	Disease intensity	Number of genotypes	Genotypes
0	Immune	-	-	-
1	Resistant	1-15 %	02	COHB-9, COHB-32
2	Moderately resistant	16-25 %	02	COHB-10, COHB-40
3	Moderately susceptible	26-50 %	22	COHB-2, COHB-5, COHB-12, COHB-13, COHB-14, COHB-16, COHB-17, COHB-18, COHB-20, COHB-21, COHB-23, COHB-25, COHB-26, COHB-27, COHB-28, COHB-30, COHB-33, COHB-34, COHB-35, COHB-36, COHB-37 and COHB-41
4	Susceptible	51-75 %	14	COHB-1, COHB-3, COHB-4, COHB-6, COHB-7, COHB-11, COHB-15, COHB-19, COHB-22, COHB-24, COHB-29, COHB-31, COHB-38 and COHB-39
5	Highly susceptible	Above 76 %	01	COHB-8