



P-ISSN: 2349-8528

E-ISSN: 2321-4902

www.chemijournal.com

IJCS 2020; 8(3): 2830-2832

© 2020 IJCS

Received: 16-03-2020

Accepted: 20-04-2020

GP NagCollege of Horticulture and
Research Station, Jagdalpur,
Chhattisgarh, India**HC Nanda**College of Horticulture and
Research Station, Jagdalpur,
Chhattisgarh, India**J Singh**College of Agriculture, Raipur,
Chhattisgarh, India**Anurag Kerketta**College of Horticulture and
Research Station, Jagdalpur,
Chhattisgarh, India**Vikas Ramteke**Shaheed Gundadhur College of
Agriculture and Research
Station, Jagdalpur,
Chhattisgarh, India**Bhupendra Kumar**College of Agriculture, Raipur,
Chhattisgarh, India**Corresponding Author:****GP Nag**College of Horticulture and
Research Station, Jagdalpur,
Chhattisgarh, India

Screening of colocasia genotypes for natural occurrence and reactions against leaf blight disease

GP Nag, HC Nanda, J Singh, Anurag Kerketta, Vikas Ramteke and Bhupendra Kumar

DOI: <https://doi.org/10.22271/chemi.2020.v8.i3ao.9644>

Abstract

Twenty four genotype of colocasia were collected from throughout the Chhattisgarh state and screened against leaf blight disease in natural occurrence and infection at field condition for reactions during *Kharif* season of 2018 and 2019. Results revealed that among screened genotypes, three genotypes (IGCOL-PITH-17-1, IGCOL-PKJ-17-1 and IGCOL-CHLN-17-1) showed least terminal per cent disease infection (0.00%) in both years (during 2018 & 2019). Likewise the average terminal per cent disease infection also 0.00% and were significantly superior over rest of the genotypes. In reaction levels, three genotypes (IGCOL-PITH-17-1, IGCOL-PKJ-17-1 and IGCOL-CHLN-17-1) were found having no reactions *i.e.* resistant, six genotypes (IGCOL-BDL-17-1, IGCOL- PWND-17-2, IGCOL-KS-10-1, IGCOL-KS-13-2, IGCOL-CHHTD-18-1 and IGCOL-MUNG-17-1) were exhibited moderately resistant, eleven genotypes (IGCOL-BNR-17-1, IGCOL-MNDG-17-1, IGCOL-GB-17-1, IGCOL-DK-17-1, IGCOL-BL-12-1, IGCOL-JS-12-1, IGCOL-KDKN-17-1, IGCOL-PWD-17-1, IGCOL-CHMD-18-1, IGCOL-LHDD-18-1 and White Gauriya (S.C.)) were recorded moderately susceptible and two genotypes *viz.*, IGCOL-KOTA-17-1 and IGCOL-SPL-17-1 were observed to be susceptible while, two genotypes (IGCOL-NGR-17-1 and IGCOL-PWND-17-1) were found highly susceptible against *Phytophthora* leaf blight disease of colocasia under *in-vivo* condition.

Keywords: Colocasia genotype, *Phytophthora*, Screening and PDI

Introduction

Colocasia is a tuber crop, grown throughout India because of its wide adoptability, large scale acceptability and high return unit area⁻¹ (Gurung, 2001) [1]. Indian states: Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh Maharashtra, Tamil Nadu and West Bengal where it is grown well in lowland and upland area. The corms and cormels are consumed as staple or subsistence food in developing countries. This is member of the Araceae family and is believed to be one of the earliest cultivated tuber crops in the world. Colocasia is now the fifth most-consumed tuber vegetable worldwide (Lokesh *et al.*, 2014) [2]. Cormels are rich source of calcium, phosphorus, protein, starch and vitamin C (Fageria *et al.* 2006) [3]. Nutritive value of colocasia is given as per 100gm fresh tuber *i.e.* moisture(g) 73.1, Protein(g) 3.0, Fat(g) 0.1, Minerals(g) 1.7, fibre(g) 1.0, Carbohydrate(g) 21.10, Energy Kcal 97.0, Calcium(Mg) 40, Phosphorus(mg) 140, Iron(mg) 1.7, Vitamin A (IU) 24, Thiamine(mg) 0.09, Niacin(mg) 0.4 and Riboflavin (mg) 0.03 (Misra *et al.*, 2008) [4].

The crop is affected by several pathogens among them *Phytophthora colocasiae* Raciborski a oomycetes fungus cause the most destructive disease and is responsible for causing leaf blight and lead to heavy yield losses (25 to 50 per cent) of taro in India (Gadre and Joshi, 2003) [5]. Leaf blight of colocasia was reported for the first time in India, by Butler and Kulkarni, (1913) [6]. Occurrence of *Phytophthora* blight and subsequent yield loss may have a negative impact in cultivation of this crop by the farming communities. In this situation, it was necessary to find out a resistant variety if any among the available genotypes against *Phytophthora colocasiae* under field conditions. Hence keeping these facts in mind present experiment was laid out to screening collected genotypes against *Phytophthora colocasiae* which cause severe losses in colocasia cultivation.

Materials and Methods

Colocasia genotypes were collected from overall Chhattisgarh and were grown at Research cum Instructional Farm of Saheed Gundadhur College of Agriculture and Research Station, Jagdalpur. Experiments were conducted during *Khari* season of 2018 and 2019 respectively, using Randomized Block Design (RBD) which comprised twenty four treatments with three replications. Visual observations on initial and final disease symptoms were recorded in the field to know the development of the disease in a plant population under natural condition. For disease incidence, 5 plants were randomly selected and recorded. The selected plants were tagged and observations on disease incidence were recorded on same plants, twice at 15 days interval during both of year. The disease rating scale proposed by Little and Hills (1978) [7], was followed to record the observations and per cent disease intensity (PDI) was calculated by the formula given

by McKinney (1923) [8]. A scale from 0 to 5 was used for assessing the disease for estimation of leaf blight where in, 0 grade– No disease, 1 grade -1-10% disease, 2 grade -11-25% disease, 3 grade -26-50% disease, 4 grade - 51-75%, 5 grade >75% disease. Recorded data were analysed online in OPSTAT statistical software package for agricultural research workers developed by Sheoran *et al.* (1998) [9] at CCS HAU, Hisar. Critical difference was calculated at the level of 0.05% degree of freedom.

Results and Discussion

All the 24 colocasia genotypes collected from different regions of entire Chhattisgarh state were screened for disease incidence against colocasia leaf blight (*Phytophthora colocasiae*) under *in-vivo* condition and results are presented in Table 1 and 2.

Table 1: Screening of colocasia genotypes for their reaction against leaf blight disease

Genotypes	Terminal per cent disease infection			Score
	2018	2019	Mean	
IGCOL-PITH-17-1	0.0 (0.0)*	0.0 (0.0)*	0.00	0
IGCOL-KOTA-17-1	71.0 (57.4)	69.7(56.7)	70.35	4
IGCOL-NGR-17-1	85.0 (67.3)	89.3 (71.7)	87.15	5
IGCOL-SPL-17-1	70.7 (57.7)	74.3 (61.7)	72.53	4
IGCOL-PWD-17-1	28.7 (31.7)	36.0 (35.4)	32.35	3
IGCOL-PWND-17-1	95.3 (79.7)	98.7 (86.1)	97.00	6
IGCOL-KS-10-1	19.3 (25.9)	18.3 (24.8)	18.80	2
IGCOL-KS-13-2	21.3 (26.4)	16.0 (23.1)	18.65	2
IGCOL-BL-12-1	29.0 (32.3)	27.0 (29.9)	28.00	3
IGCOL-JS-12-1	28.7 (31.2)	28.7 (31.2)	28.70	3
IGCOLS-BDL-17-1	10.3 (18.6)	12.7 (20.5)	11.50	2
IGCOL-PKJ-17-1	0.0 (0.0)	0.0 (0.0)	0.00	0
IGCOL-CHLN-17-1	0.0 (0.0)	0.0 (0.0)	0.00	0
IGCOL-MNDG-17-1	13.7 (21.0)	12.7 (20.5)	26.40	3
IGCOL-GB-17-1	26.0 (29.9)	27.7 (31.7)	26.85	3
IGCOL- PWND-17-2	14.0 (18.1)	10.7 (15.7)	12.35	2
IGCOL-BNR-17-1	26.3 (30.8)	26.3 (30.8)	26.30	3
IGCOL-KDKN-17-1	34.7 (35.1)	28.0 (31.2)	31.35	3
IGCOL-MUNG-17-1	24.7 (27.9)	23.0 (30.1)	23.85	2
White Gauriya (S.C.)	42.3 (40.5)	42.3 (40.5)	42.30	3
IGCOL-DK-17-1	27.7 (31.5)	27.3 (30.9)	27.50	3
IGCOL-CHHTD-18-1	23.7 (29.0)	21.3 (25.7)	21.50	2
IGCOLS-CHMD-18-1	35.3 (36.3)	35.0 (36.1)	35.15	3
IGCOLS-LHDD-18-1	35.7 (36.6)	35.3 (36.2)	35.50	3
SEm±	4.65	4.30		
CD (0.05%)	13.29	12.28		

(* figure in parentheses are arcsine values)

Among the twenty four genotype of colocasia, three genotypes (IGCOL-PITH-17-1, IGCOL-PKJ-17-1 and IGCOL-CHLN-17-1) showed least terminal per cent disease infection (0.00%) in both years (during 2018 & 2019). Likewise the average terminal per cent disease infection also 0.00% and were significantly superior over rest of the

genotypes. On an average it was followed by IGCOL-BDL-17-1 (11.50%), IGCOL-PWND-17-2 (12.35%) and IGCOL-MUNG-17-1 (23.85%) whereas, the highest terminal per cent disease was recorded in IGCOL-PWND-17-1 (97.00%) presented in Table 1.

Table 2: Terminal disease severity and their reaction to different genotypes of colocasia

Disease rating scale	Terminal disease severity (%)	PDI (Mean)	Name of genotypes	Reaction
0	0	0.00	IGCOL-PITH-17-1	I
		0.00	IGCOL-PKJ-17-1	
		0.00	IGCOL-CHLN-17-1	
1	1-10	-	-	R
2	11-25	11.50	IGCOL-BDL-17-1	MR
		12.35	IGCOL- PWND-17-2	
		18.80	IGCOL-KS-10-1	
		18.65	IGCOL-KS-13-2	
		21.50	IGCOL-CHHTD-18-1	

		23.85	IGCOL-MUNG-17-1	
3	26-50	26.30	IGCOL-BNR-17-1	MS
		26.40	IGCOL-MNDG-17-1	
		26.85	IGCOL-GB-17-1	
		27.50	IGCOL-DK-17-1	
		28.00	IGCOL-BL-12-1	
		28.70	IGCOL-JS-12-1	
		31.35	IGCOL-KDKN-17-1	
		32.35	IGCOL-PWD-17-1	
		35.15	IGCOL-CHMD-18-1	
		35.50	IGCOL-LHDD-18-1	
		42.30	White Gauriya (S.C.)	
4	51-75	70.35	IGCOL-KOTA-17-1	S
		72.53	IGCOL-SPL-17-1	
5	Above 75	87.15	IGCOL-NGR-17-1	HS
		97.00	IGCOL-PWND-17-1	

Pooled data showed various levels of reactions among the collected genotypes. Three genotypes (IGCOL-PITH-17-1, IGCOL-PKJ-17-1 and IGCOL-CHLN-17-1) were found having no reactions *i.e.* resistant, six genotypes (IGCOL-BDL-17-1, IGCOL-PWND-17-2, IGCOL-KS-10-1, IGCOL-KS-13-2, IGCOL-CHHTD-18-1 and IGCOL-MUNG-17-1) were exhibited moderately resistant, eleven genotypes (IGCOL-BNR-17-1, IGCOL-MNDG-17-1, IGCOL-GB-17-1, IGCOL-DK-17-1, IGCOL-BL-12-1, IGCOL-JS-12-1, IGCOL-KDKN-17-1, IGCOL-PWD-17-1, IGCOL-CHMD-18-1, IGCOL-LHDD-18-1 and White Gauriya (S.C.)) were recorded moderately susceptible and two genotypes *viz.*, IGCOL-KOTA-17-1 and IGCOL-SPL-17-1 were observed to be susceptible while, two genotypes (IGCOL-NGR-17-1 and IGCOL-PWND-17-1) were found highly susceptible against *Phytophthora* leaf blight disease of colocasia under *in-vivo* condition exhibited in Table 2. Similar results were also reported by Kumar and Dubey (1996) ^[10] screened 15 genotypes against colocasia leaf blight disease. The two local varieties were found to be immune to the disease. Lokesh *et al.* (2018) ^[2] screened eleven germplasm of *C. esculenta* and *X. sagittifolium* were evaluated for their response to leaf blight along with plant characters whereas, one germplasm was found *Colocasia esculenta* Acc 3 is locally known by Makkalakesa and it is a good germplasm for screening of other germplasm for the disease reaction. Saykar *et al.* (2019) ^[11] screened 9 varieties for disease reaction against *Phytophthora colocasiae*. Among 9 varieties none of the variety was showed neither immune nor resistant. TCbl 12-2, TCbl 12-5 and TCbl 12-7 were the moderately resistant and TCbl 12-1, TCbl 12-4, TCbl 12-6 and Mukteshwari were susceptible and TCbl 12-3 and Telia were susceptible genotype. These findings are in agreement with findings of Shankar *et al.* (2012) ^[12] found that the per cent infection of *Phytophthora* leaf blight ranged from 2-20% in 145 genotypes of which 53 were free from *Phytophthora* leaf blight. Padmaja *et al.* (2016) ^[13] found that Variety KCS-3 showed moderately resistant reaction to all the isolates of *Phytophthora colocasiae*.

References

- Gurung K. Management and yield loss assessment of colocasia blight. M.Sc. (Ag.) thesis submitted to CSKHPKV, Palampur, India, 2001
- Lokesh MS, Patil SV, Naik N, Prashantha A and Chandan K. Evaluation of germplasm of *Colocasia esculenta* (L.) Schott and *Xanthosoma sagittifolium* (L.) Schott against leaf blight (*Phytophthora colocasiae* Raciborski.) in Central Western Ghats of Uttara Kannada of Karnataka in India. Int. J Adv. Res. Biol. Sci. 2014; 1(6):180-184.
- Fageria MS, Chaudhary BR and Dhaka RS. *Vegetable Crops Production Technology*. Kalyani Publishers, New Delhi. 2006; 2:249-252.
- Misra RS, Sharma K, Mishra AK. *Phytophthora* leaf blight of taro (*Colocasia esculenta*)- a review. The Asian and Australasian Journal of Plant Science and Biotechnology. 2008; 2:201-208.
- Gadre UA, Joshi MS. Influence of weather factors on the incidence of leaf blight of colocasia. Ann. Pl. Protec. Sci. 2003; 11:168-170.
- Butler EJ, Kulkarni GS. Colocasia blight caused by *P. colocasiae* Rac. Memosis of the Deptt. of Agric. in India. 1913; 5:233-259.
- Little TM, Hills FJ. *Agricultural experimentation: design and analysis*. Somerset, NJ: John Wiley & Sons Inc, 1978.
- Mackinney. A new system of grading plant disease. Journal of Agricultural Research. 1923; 26:195-218.
- Sheoran OP, Tonk DS, Kaushik LS, Hasija RC, Pannu RS. Statistical Software Package for Agricultural Research Workers. Recent Advances in information theory. Statistics and Computer Applications by D.S. Hooda and R.C. Hasija Department of Mathematics Statistics, CCS HAU, Hisar, 1998, 139-143.
- Kumar R, Dubey SC. Screening of Colocasia genotypes for resistance to Phytophthora leaf blight. Tropical tuber crops: Problems, prospects and future strategies, 1996, 388-390.
- Saykar AD, Borkar PG, Naim A, Valvi HT. *In vitro* screening of colocasia varieties or genotypes for their reaction against the *Phytophthora colocasiae* Racib. International Journal of Chemical Studies. 2019; 7(1):513-515.
- Shankar D, Singh P, Narayan K, Rao SS, Singh J. Screening of Colocasia genotypes for disease, insect and rhizome yield under Bastar Plateau Agroclimatic Zone of Chattisgarh. Global Conference on Challenges and Opportunities for Tuber Crops, 2012.
- Padmaja G, Uma Devi G, Mahalakshmi BK, Sridevi D. *In vitro* screening of Taro Varieties against *Phytophthora* Leaf Blight Disease. Indian Journal of Root Crops. 2016; 42(1):57-60.