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Evaluation of Acid lime Varieties for Growth, Yeild and Quality Parameters

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ABSTRACT

Evaluation studies were carried out in acid lime for selection of cultivars suitable for growing in the tropical region of Petur, Venkatagiri, Nellore Dist. Seventeen acid lime cultivars *viz*., CRS-I, ,CRS-21, Balaji, PKM-1, Pramalini, Vikram, Chakradhar, Punjab lime ,TAL 94-14, TAL 94-3,TAL 94-2 RHRL - 49, 122, 124, 159 were evaluated for quality attributes for two years 2012 and 2013 at Citrus Research Station, Petlur, Andhra Pradesh. The results revealed that the quality parameters *viz*., highest juice content, acidity, total soluble solids, thickness, fruit weight, was recorded in the cultivar CRS-I, ,CRS-21, Balaji, followed by Vikram, Pramalini. The quality character estimates and growth parameters will be more effective in selection of acid lime cultivars for tropical region of Nellore.

Key words: *Acid lime cultivars, Evaluation, Quality.*

Among the three types of citrus fruits grown in India, *viz.,* sweet orange, mandarins and lime/lemon, the area under cultivation of acid lime(*Citrus aurantifolia* Swingle), popularly known as Pati lime or Kagzi lime, is steadily increasing.

Acid lime (*Citrus aurantifolia* Swingle) is an important commercial species of citrus considered to be indigenous to India, and is extensively cultivated in many states under tropical and subtropical climatic conditions. India is the largest producer of acid lime in the world, (Chadha, 2002). Andhra Pradesh is one of the major citrus producing states in the country with total area about 1.28 lakh hec (24.2%)and acid lime production around 0.46 lakh hec. Acid lime cv. Balaji a canker resistant high yielding Acid lime clone was developed and released for commercial cultivation in AP during 2006. It is widely cultivated in Nellore, Kadapa, Ananthapur, Prakasham, Mahabubnagar under rainfed and irrigated conditions. In Tamilnadu acid lime is cultivated in the districts of Dindigul, Trichy, Tirunelveli, Virudhunagar, Ramanathapuram, Madurai, Theni etc., in an area about 2,075 ha with a production of about 6,400 tonnes per annum (Anonymous, 2014).

Availability of a wide gene pool in the form of genetic diversity is a prerequisite for crop improvement. Genetic diversity is the extent of genetic variability among the individual in a single species and between the species. In recent years, collection and conservation were primarily made for the quality of fruits. The great genetic diversity is under serious threat of rapid extinction or depletion of the germplasm mainly due to population pressure and farmers preference (Singh *et al*., 2004).

At Periakulam PKM-1 acid lime was selected which gives high yield of quality fruits-Short juvenile Ponicirus was also spotted during a survey. At Rahuri, 150 accessions of acid lime were collected with desirable traits of yield, resistance to canker and leaf miner and higher summer yield. Five of these accessions have potential for commercial exploitation. One of the accessions has been selected and released as Sai Sarbati for its cultivation in Maharashtra region. Similarly, exploration of citrus orchards have also resulted in selection of superior clones of acid lime and sweet oranges at Tirupati and Rahuri.

Significant achievements in acid lime have been obtained in cultivar improvement which has been in cultivation for many years A successful progress in breeding depends upon the genetic variability present in population for further breeding programme.

Acid lime is more popular for its uses in preparation of refreshing juice and in seasoning foods and making of pickles. Acid lime pickles are very popular not only in India but also in other parts of the world. India exports small quantum of acid

Table I. Data recorded on biometric observations of different acid lime clones.

S No	Name of the accession	Stem girth (cm)	Plant height (mt)	Plant spread E W	Plant spread N S	Plant volume (cu m)	Fruit Yeild
1	Vikram	42	4.1	5	5	96.4	815
2	Pramalini	73	4.7	7.2	7.7	125.3	1430
3	PKM-1	50	4.7	6.5	6.4	93.0	1473
4	Chakradhar	51	4.4	5	4.7	44.8	1137
5	Balaji	51	4.9	7.2	7.0	138.5	2233
6	TAL 94-14	52	4.1	6.9	7.0	92.3	2756
7	TAL 94-3	45	4.8	5.3	5.6	61.2	1016
8	TAL 94-2	47	5.3	5.5	5.7	79.4	1208
9	RHRL-159	41	4.6	5.9	5.3	59.0	928
10	RHRL-122	34	4.5	3.5	4.3	29	936
11	RHRL 49	58	5.4	5.5	5.3	66.9	1159
12	RHRL-124	39	3.8	4.5	4.6	34.4	947
13	RAL 94-4	55	4.0	6.4	6	108.8	1296
14	CRS- 21	54	5.2	7.6	7.4	138.1	2328
15	CRS - 1	55	5.5	7.7	7.4	153.7	2352
16	Punjab lime	54	5.1	5.7	5.7	80.6	1456
17	Local	51	5.1	4.6	4.8	47.8	914
	Sed	0.83	0.16	0.23	0.05	0.71	76.1
	CD@5%	1.70	0.33	0.47	0.10	1.45	155.1

lime pickles to other countries *viz.*, USA, England etc. It is also used in the manufacture of lime squash either alone or in combination with lemons and other citrus fruits. It is a good source of vitamin C and has good antioxidant properties. The purpose of the present study was to evaluate different varieties of acid lime cultivars with emphasis on quality attributing characters and increasing adaptability under tropical region of Nellore dist.

MATERIAL AND METHODS

The experimental field was situated at the Citrus Research Station.Petlur, Venkatagiri. A total of 17 acid lime varieties in the Rutaceae family are maintained Citrus Research Station Petlur, Venkatagiri dist Nellore. It comprised of CRS.1, CRS -21, Balaji, Punjab lime, Chakradhar, Local, Vikram, Pramalini,PKM-1, TAL-94/14, TAL-94/2, TAL-94/3, RHRL94-4, RHRL-124, RHRL-122, RHRL-159, RHRL-49,Local . The plants are planted during the year 2003 planted at 6 x6 mt spacing in the farm. The soil is red loamy type and the temperatures are very hot which reaches up to 47 degrees during summer months and dry weather persists for almost nine months in a year. Six plants in each variety at a distance of 6x6 mt were planted and-maintained. The irrigation is carried out through drip with 16 mm lateral pipes.

RESULTS AND DISCUSSION

The data presented in Table 1 reveals that there is significant difference between different varieties of acid lime for various characters such as plant height, spread and plant volume and yield.

The highest height of the plant was recorded in CRS-1, CRS-21, Punjab lime, TAL94-2 (5.1 to 5.5m) followed by Pramalini, PKM-, TAL94-3 (4.5 to 4.7 mt). While RHRL-124 recorded the lowest height of plant (3.8 mt). Similar trends were observed by Ingle et al.2004, Bagde and Patil 1989. In respect to plant spread the maximum plant spread was recorded in CRS-1,CRS-21, Pramalini,TAL94-14 (7.0 to7.7) followed by PKM-1 (6.5) and minimum in RHRL-122 (3.5). In respect to plant

Table II Quality attributes of Acid lime clones under Petlur condition

S.No	Name of the accession	Fruit weight (10) gm	Fruit weight	Thickness (mm)	Juice (ml)	No. of seeds	TSSBrix	Acidity (%)
1	Vikram	415	42	2	23.5	5	7	7.25
2	Pramalini	445	42	1.85	24.5	4	6	6.65
3	PKM-1	470	43.5	2.1	19.5	5	5	7.45
4	Chakradhar	375	33.5	1.85	9.5	5	6	6.55
5	Balaji	445	46	2.05	28.5	7	7	7.45
6	TAL 94-14	485	51.5	3.1	11.5	5	6	7.15
7	TAL 94-3	384	42.5	3.1	13	7	5	6.75
8	TAL 94-2	435	46.5	2.15	12.5	10	7	6.7
9	RHRL-159	415	36.5	2.1	15	5	6.5	6.1
10	RHRL-122	425	41	2.1	15.5	9	6	6.25
11	RHRL 49	485	45.5	3.1	14.5	10	5.5	6.05
12	RHRL-124	440	44.5	2.05	16.5	7	5	6.2
13	RHRL 94-4	380	41	2.1	17.5	11	5.5	6.2
14	CRS 21	420	46	2.1	30	7	7	7.45
15	CRS 1	435	46.5	2	29	8	7	7.35
16	Punjab lime	435	51	2.1	16.5	6	5	6.1
17	Local	325	32.5	2.1	11.5	5	5.5	6.65
	Sed	19.5	2.7	0.03	1.07	0.55	0.35	0.11
	CD 5 %	41.3	5.9	0.07	2.27	1.17	0.74	0.23

volume maximum was observed for variety CRS-1,CRS-21, Pramalini (125- 153.90 cu.m) whereas the RHRL-122 recorded the lowest tree volume (29.0 cu.m).Similar trends were observed by Ingle et al.2004, Bagde and Patil 1989, Desai et al 1994. Among the seventeen cultivars, the highest juice content was recorded in the cultivar CRS- 21 (30 ml) followed by CRS -1 (29ml), Balaji (28.5 ml), Pramalini (24.5ml), Vikram (23.5ml). The lowest juice content was observed in Chakradhar (9.5ml). This finding is in concurrence with the report of Badiyala *et al*. (1993) who reported that the variation in percentage of juice indicates more scope for selection, since higher juice content in fruits signifies superiority of acid lime strain (Josan and Kaur, 2006).

The qualitative characteristics of fruits varied among the varieties probably due to genetic composition of the varieties. These findings were also reported by Mitra *et al*. (2006). The highest TSS was recorded in CRS -21, CRS-1,Tenali,Vikram,TAL 94-2, (7.0 brix) followed by Chakradhar, TAL94-14, RHRL-122 (6.0- 6.5 Brix). The lowest total soluble solids were recorded in PKM-1,Tal 94-3,Punjab lime 5.0 Brix). These findings were also reported by Mitra *et al*. (2006).

The highest acidity was recorded in Balaji, CRS -2,CRS-1,Vikram,PKM-1 (7.25- 7.45%) followed by Pramalini,Chakradhar (6.5 – 6.6%). The lowest acidity was observed in Punjab lime (6.1%), and the highest fruit thickness was recorded in RHRL-122, TAL 94-14 (3.1) followed by Balaji, CRS-21, CRS-1 (2- 2.1). Maximum number of seeds was recorded in RHRL-49 (10) followed by Balaji,CRS-21, CRS-1 (7-8). Maximum weight of fruit was recorded in TAL94-14 (51.5 gm) followed by CRS-1,CRS-21,Balaji , Vikram, Pramalini (42-46 gm), and lowest was recorded in Chakradhar (33.5 gm) Environmental factors such as long dry spell, high temperature and varietal differences, improved the quality of fruits. These findings were also reported by Singh *et al.* (1977).

In acid lime, juice content, TSS, acidity, and flavor provide quality to the fruit. In this research study variety Balaji, CRS-21, CRS-1,Vikram and PKM-1 recorded highest quality traits

for extensive cultivation under tropical region of South India.. These findings are in close conformity with the results of Lodh *et al.* (1974) and Kulkarni and Rameshwar (1981) in mango.

The difference in quality traits is an important factor for identification of superior clones or varieties. The highest juice content, T.S.S, acidity and ascorbic acid content were found superior for best clone selection (Reddy *et al*., 2004; Srinivas *et al*., 2006) in seedling strains of kagzi lime. In this study Balaji, CRS-21,CRS-1, Vikram and PKM-1 were superior in their quality point of view. These findings are also in agreement with the findings of Sahoo *et al*. (2005).

Conclusion :

Seventeen lime varieties were studied for their quality attributing characters. Among the varieties cv. CRS-21, CRS-1 Balaji had registered highest juice content, TSS, fruit thickness, content and lowest acidity content during both the seasons. Vikram, followed by PKM-1 are suitable for growing in the hot tropical region of South India.

LITERATURE CITED

Anonymous 2014 Area and production of acid lime in TamilNadu. Hort Stat., 135 pp.

Badiyala S D, Bhargava J N and S C Lakhanpal 1993 Variability studies in kagzi lime (*C. aurantifolia* Swingle) strains of Paonta valley of Himachal Pradesh. *Punjab Hort. J*., 32 (1 –4) : 5 – 9

Bagde T R, Patil V S 1989 Chakradhar lime a new thorn less and seedless selection in lime (Citrus aurantifoliaSwingle). Ann Plant Physiol 3: 95-97.

Chadha K L 2002 *Hand book of Horticulture*. ICAR Publication, New Delhi. 209 pp.

Josan J S and Kaur Nirmajit 2006 Variability and character association analysis in identified mandarin germplasm. *Indian J. Hort*., 63 (2) : 152 – 154.

Kulkarni V and Rameshwar A 1981 Biochemical and physical composition of fruits of some important Indian mango cultivars. *Prog. Hort*., 13 : 5 – 8.

Lodh S B, Subramanyan M D and Divakar N G 1974 Physico- chemical studies of some important mango varieties.

Mitra S, Mandal K K, Kundu S and Ghosh S K 2006 Quality evaluation of sapota fruits grown in terai region of West Bengal. *The Hort. J.,* 19 (3): 358 – 359.

Reddy B M C, Patel P, Sathish kumar S and Govindaraju L R 2004 Studies on physic-chemical characteristics of jack fruit clones of south Karnataka. *Karnataka J. Agric. Sci.*, 17 (2) : 279 – 282.

Sahoo R K, **Das A K, Singh B and Satpathy S K 2005** Performance of some strawberry cultivars in coastal zone of Orissa. *Orissa J. Hort.*, 33 (2): 50-52.

Singh H P, Jalikop S H, Subbaiah M T and Iyer C P A 1977 Genotypic and Phenotypic variability in mandarins. Contribution No. 572 of Indian Institute of Horticultural Research, Bangalore, Karnataka (India).

Singh I P, Singh Shyam and Verma S K 2004 Citrus genetic diversity in Uttaranchal. *Prog. Hort*., 36 (2) : 234-240.

Srinivas N, Athani **S I, Sabarad A I, Patil P B, Kotikal Y K Swamy, G S K and Patil B 2006** Studies on variability of fruit physical characters, quality and yield in seedling strains kagzi lime (*C. aurantifolia* Swingle). *J. Asian Hort*.**,** 2 (3) : p.148 –150.

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