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RANGEENI LAC PRODUCTION ON *CAJANUS CAJAN* (L.) MILLSP

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ABSTRACT

Lac production on pigeonpea a few an opportunities to resource poor small and marginal farmers to double their income. Among the ten genotypes evaluated, Lakhnadon-2 performed better with highest lac production of 414 g per plant. This genotype also had highest percent of secondary branches with lac insect settlement the mean weight of 100 lac cells was also significantly highest (3.27 g), indicating that Lakhnadon-2, provides better phloem sap to the lac insects growing on it.

***Keywords*:** Pigeonpea, yield, seeds, agriculture, morphology

Introduction

Small and marginal farmers (SMFs) constitute the predominant farmers group in Madhya Pradesh (MP) India with about 72 percent (Anon, 2017). This group generally practices subsistence farming that never was profitable (Saxena *et al*., 2020; Anon, 2020). Improving household income of SMFs is very important to improve their socio-economic states (Bisht *et al.,* 2020). Inclusion of a low input cash crop in their production system can be one of the approach. MP is the largest producer of pigeonpea with acreage of 0.64 mha and 8.39 lakh ton productions (Anon, 2017-18). Similarly, the state is also the 3rd largest producer of lac in the country (Sarvade *et al*., 2018). Lac is a resinous secretion of lac insect (*Kerria lacca* Kerr.) grown on its 400 host plants (Sharma, 2017; Kaushik *et al*., 2012). Fortunately pigeonpea is a good annual host of lac insect (Vajpayee *et al.,* 2019a,b; Patidar, 2019; Ghosh *et al.,* 2014; Zhenghong *et al*., 2001). Promotion of lac production on pigeonpea in MP is carried out since 2000 (Thomas, 2003). In the state farmer grow local tall and long duration pigeonpea genotypes since ages. Lac production is performs better on tall long duration pigeonpea with good branching. Thus a field evaluation was carried out on a local tall and long duration pigeonpea and a released variety TJT-501.

Materials and Methods

A field trial was conducted to study the performance of lac insect *Kerria lacca* on ten genotypes of *Cajanus cajan* (L.) Millsp, in JNKVV, Jabalpur, Madhya Pradesh from May 2019 to June 2020. The topography of the experimental field was fairly uniform and all physical facilities were adequately available. Nine tall and long duration genotypes of *Cajanus cajan* (Table-1) as well as a released variety TJT-501 was replicated thrice in a RBD format. Jabalpur lies in the Kymore plateau and Satpura hill zone, where the weather is sub humid, featured by hot dry summer and cool dry winter.

Nursery raising of *C. cajan*

Nursery of ten genotypes of *C. cajan* were raised in perforated polythene bag (18 x 16 cm) filled with substrate (*Kapu* + FYM). Seeds treated with *Trichoderma viridae, Rhizobium* and PSB were sown in there polythene bags and kept in shade for its germination. The seedlings were sprayed with contact insecticides to prevent insects pests. The seedlings were nipped from the growing tip at 8-12 days interval till its transplantation, to train the seedlings to a bush form.

Transplantation

In plot size of 56 feet x 54 feet 90 *C. cajan* plants were accommodate. The spacing of 6 feet between plant to plant and row to row was maintained. The inter space between the replications were 10 feet.

Substrate

Transplantation of pigeonpea seedlings was done in each PPB weighed 125 g of size 93 cm x 61 cm was with substrate filled polypropylene bag (PPB) homogeneously mixed substrate consisting of 45 kg river bed basin soil (*Kapu*) and 20 kg well rotten Farmyard manure, (Patent application no 201921005340 A dated 01.03.2019). The substrate was filled into the PPB with help of a *tasala* followed by constantly shaking the bag to ensure proper compactness PPB when filled with 65 kg substrate attained a dimension of 46 cm height and 125 cm circumference. Availability of Nitrogen, Phosphorous and Potash in 65 kg of substrate was 136.15 g, 45 g and 304 g respectively.

Transplantation of *C. cajan* seedlings

C. cajan seedlings on attaining a height varying from 1.5 feet to 2 feet were transported to the main field and transplanted in the PPB. Each of the 90 saplings were place adjacent to substrate filled PPB. The polythene bag of the *C. cajan* seedlings was carefully removed without disturbing its root system, before transplanting in the substrate filled PPB in the evening hours of 05th July 2019. The transplanted seedlings were pressed from all sides to remove air pockets followed by watering.

Plant protection

Insecticides were sprayed on *C. cajan* plants to protect lac insects from its predator and foliage feeders. First spray of Cartap hydrochloride 50%SP @ 1g/litre was at 30 days after BLI, while the second spray of Cartap hydrochloride+ Dithane M-45 75%WP was at 60 days after BLI. The transplanted *C. cajan* was again nipped at 10-12 days interval between 12th July 2019 the last week of September 2019.

Irrigation

Each of the PPB with *C. cajan* plant was irrigated at regular intervals. There was no irrigation between August to October, due to rains, while from November to February the irrigation was 15 days interval and at 10 days interval from March 2020 to June 2020, it was at 10 days interval. Approximately 10 litres of water was at given per plant during each irrigation.

Brood lac inoculation (BLI)

Rangeeni brood lac was purchased from M/s Adarsh Lac Samiti, Jamankhari village, Tehsil Barghat, District Seoni, M.P. on 11.11.2019. Predator free good quality brood lac was sorted before its inoculation on *C. cajan*. Brood lac stick weighing 15 g was tied at the base of each *C. cajan* in the PPB on with the help of a twine.

Phunki removal pertains to the removal of left over brood lac twigs from *C. cajan* after complete emergence of lac nymphs from mother lac insect cells. *Phunki* was carefully removed from *C. cajan* plants 21 days after BLI without damaging the lac insect settlement on the plants.

Plant Height:

Plant height was recorded on 15 Oct' 2019, 20 Nov' 2019, 20 Dec' 2019, 29 Jan' 2020 and 01 Mar' 2020.

Harvest of Lac crop

C. cajan with lac was harvested on 12.06.2020 by cutting the plant from the base. The harvested *C. cajan* plant were shade dried for four days. All the branches with lac encrustation were separately kept measured and tagged. Lac was scrapped from the branches after keeping a clean polythene sheet beneath them. Lac was scrapped after harvesting of *C. cajan* plant between 24th June to 25th June 2020. The lac thus obtained was dried and weighing was done at 28th June 2020.

Results and Discussion

(a) Effect of lac insects on mean plant height (MPH) genotypes of *C. cajan*

MPH varied from 111.83 cm (Gadarwara) to 144.83 cm (TJT-501) on 15.10.2019 (102 DAT). It was significantly highest in TJT-501 while MPH of rest of the genotypes were at par among them (Table-2). On 20.11.2019 (137 DAT; 5 days after BLI), MPH varied from 142.67 cm (Gadarwara) to 195.17 cm (TJT-501). Though genotypes TJT-501, Korsar-3, Amarkantak-4 and Lakhnadon-2 had significantly higher MPH over rest of the genotypes, but were at par among themselves. On 20.12.2019 (167 DAT; 35 days after BLI). MPH varied from 165.50 cm (Gadarwara) to 225.17 cm (Korsar-3). It was significantly higher in Korsar-3 and Lakhnadon-2 over rest of the genotypes which was at par among them. On 29.01.2020 (207 DAT; 75 days after BLI) MPH varied from 175.17 cm (Gadarwara) to 240.83 cm (Korsar-3). The latter was significantly highest over all the genotypes. Lakhnadon-2, Amarkantak-2, Korsar-2, Amarkantak-4, Amarkantak-3 and Amarkantak-1 had significantly higher MPH over Gadarwara and Saraswahi, but the former was at par among them. In the last observation on 01.03.2020 (238 DAT; 106 days after BLI) the MPH varied from 178.33 (Gadarwara) to 243.67 (Korsar-3). It was again significantly higher MPH in all the genotypes over Gadarwara and Saraswahi. There was an increase in the MPH from 15.10.2019 to 01.03.2020 among all the genotypes with lac insects feeding phloem sap from them. The overall percent increase in the MPH between the above period varied from 50.98 (TJT-501), 58.17 (Saraswahi), 59.46 (Gadarwara), 71.83 (Korsar-2), 80.65 (Amarkantak-4), 81.89 (Lakhnadon-2), 83.21 (Korsar-3), 85.78 (Amrakantak-1), 86.53 (Amrakantak-2) 91.16 (Amrakantak-4).

Percent increase in MPH of *C. cajan* genotypes with lac insects between successive observation was analysis to explore trend. There was a continuously increase in the MPH of all *C. cajan* genotypes with lac insects load on the plants. However the rate of increase in MPH was highest between 15.10.2019 and 20.11.2019, after which it steeply declined till the last observations.

(b) Effect of lac insects on the growth of *C. cajan*

(i) Mean plant height (cm) of *C. cajan* genotypes

The common indicators of plant growth are increase in height, stem thickness and number of branches (Singh and Diwakar, 1995). There was a continuous increase in the mean height of *C. cajan* genotypes with lac insects between 15.10.2019 and 20.12.2019. During this period the age of the lac insects was 41 days. This was in its immature stage when the phloem sap intake may have been less. It may have exerted less biotic stress on the host plants, so the increase in plant height remained unaffected. Increase in plant height of *C. cajan* with lac insect was reported by Vajpayee *et al.* (2019) and Patidar (2019). Comparatively slow increase in plant height after 20.12.2019 may be due to the abiotic stress due to cool weather during of December 2019 and January 2020. Podding and rapidly growing lac insects may have exerted extra biotic stress on the plant. The combination of abiotic and biotic stress may have contributed to slow increase in the plant after December 2019. Phloem feeders influence plant height and cause stunted growth in cotton (Khalil *et al*., 2017) and in mustard (Malik *et al*., 1998).

(ii) Branches per plant

The number of primary and secondary branches of *C. cajan* was recorded, as these are important for settlement of lac insect crawlers on Brood lac inoculation (BLI).

Primary branches and secondary branches per *C. cajan*

The mean number of primary branches per plant (MPB) varied from a minimum (2.17) in Amarkantak-1 to maximum (3.50) in Korsar-2. Saraswahi, Gadarwara, Amarkantak-1 were at par with each other in terms of MPB. In Korsar-2 it was significantly highest over all the genotypes except TJT-501 and Lakhnadon-2 with which it was at par (Table-3).

The mean number of secondary branches per plant (MSB) varied from a minimum (5.50) in Amarkantak-4 to maximum (11.17) in Korsar-2. Lakhnadon-2, Korsar-3, Saraswahi, Gadarwara, Amarkantak-2, Amarkantak-3 and Amarkantak-1 were at par in terms of MSB. It was significantly highest in Korsar-2 over all the genotypes but was at par with TJT-501 and Korsar-3.

Number of primary and secondary branches per *C. cajan* plant

The increase in the number of primary and secondary branches in different *C. cajan* genotypes was evaluated. It may be due to its phenotypic character as well as nipping effect. Nipping of growing tips influence branching in crop (Vajpayee *et al.,* 2019). The nine tall and long duration *C. cajan* genotypes collected from farmers had no previous study on this attributes. Yunzheng *et al.,* (1980) reported that *C. cajan* spacing of 3 feet x 6 feet accommodated 9990 plants/ha, and produced significantly 49,950 viable branches for lac production .i.e. about 5 branches per plant. In the present study there were just 2,988 *C. cajan* plant per ha and mean number of secondary branches per plant varied from 5.50 to 11.17.

(iii) Settlement of lac insects on primary and secondary branches

Brood lac inoculation (BLI) on *C. cajan* was done on 15.11.2019. Settlement of lac insects on *C. cajan* branches is very important as it decides the lac production on it.

Primary and secondary branches of *C. cajan* with lac insects

Lac insects prefer succulent branches for its settlement (Hazarika *et al.,* 2018) that is one reason of pruning of host plants of lac insects (Ghosal *et al.,* 2009; Namdev *et al.,* 2015; Shah *et al.,* 2014). As *C. cajan* is an annual shrub, its secondary branches may be comparatively more succulent than the primary branches. This may be a reason for preference of secondary branches by lac insects.

Primary and secondary branches of *C. cajan* with lac insects

After (BLI) the larvae of lac insects crawled to settle on the main stem, primary and secondary branches of the *C. cajan*. Comparatively, the settlement of lac insects were very less on main stem therefore, the settlement on primary and secondary branches were recorded as it was of economical importance.

MPB with lac insect settlement on 32nd day after BLI varied from 3.67 (Gadarwara) to 5.07 (Lakhnadon-2). It was significantly highest in Lakhnadon-2 over all the genotypes, except Korsar-2, Amarkantak-3 and TJT-501 with which it was at par. In Lakhnadon-2, 76.39 per cent of its primary branches had lac insect settlement while it was least (41.67%) in Gadarwara and Amarkantak-2. It was observed that lac insects preferred secondary branches of *C. cajan* over the primary branches for its settlement. The number MSB with lac insect settlement varied from 4.98 (Gadarwara) to 5.58 (Lakhnadon-2). It was significantly highest in Lakhnadon-2 over all the genotypes except Amarkantak-2 and Amarkantak-4 with which it was at par. Lakhnadon-2 was the most preferred *C. cajan* genotypes as 76.37 and 92.12 percent of its primary and secondary branches respectively had lac insect settlement. Gadarwara was least preferred (Table-4).

(c) Lac production on farmers cultivars

Lac production is the ultimate economical goal of the enterprise. The economic returns depend on the level of productivity (*i.e.,* production per unit area). Besides timely BLI, good lac insect settlement and nutrient status of the host, the important deciding factors for good lac productivity are:

a. Mean length of lac encrustation on the branches on the host plant (sticklac),

b. Mean lac yield per plant

c .Mean lac yield per 2.5cm^2 slot

d. Mean weight of 100 lac cells

(i) Mean length of lac encrustation on the branches on the host plant (sticklac)

The mean of length of sticklac per plant was significantly highest in Lakhnadon-2 (790.50 cm) followed by Korsar-2 (706.33 cm), TJT-501 (647.67 cm), Amarkantak-2 (542.83 cm), Korsar-3 (518.17 cm), Amarkantak-3 (509.50 cm), Amarkantak-1 (488.17 cm), Gadarwara (416.83 cm), Saraswahi (396.33 cm) and Amarkantak-4 (229.17 cm). There was significant difference in all genotypes over Amarkantak-4. The mean length of sticklac among Saraswahi and Gadarwara, Amarkantak-3, Korsar-3 and Amarkantak-2 as well as TJT-501 and Korsar-2 were at par (Table-5).

Total length of branches on the host plant with lac insect (sticklac)

Female lac insect remain sedentary all it life period after setting on the branches of the host plant. It is also the main produce of lac. The encrustation of lac insect on the host plant at maturity is called sticklac (Sharma *et al.,* 2015, Shah *et al.,* 2014). Thus the length of lac encrustation (sticklac) decides the raw lac yield from the host plant at harvest (Meshram*,* 2018). In the present case, the mean length of sticklac per plant varied from 229.17cm (Amarkantak-4) to 790.50 cm (Lakhnadon-2). Various workers in the past has also reported the sticklac length vary from 506.33 cm to 654 cm (Vajpayee *et al.,* 2019). Thus it appears from the data that Lakhnadon-2 is the best *C. cajan* genotype for the lac production.

(ii) Mean lac yield per plant

C. cajan plant were harvested on 12.06.2020 for lac yield by cutting the plants from its base. The sticklac was scrapped to obtain raw lac. Raw lac is the marketable produce. The mean lac yield per plant was highest in Lakhnadon-2 (414.50 g) followed by Korsar-2 (349.33 g), TJT-501 (340 g), Amarkantak-2 (245.83 g), Korsar-3 (245.17 g), Amarkantak-3 (240 g), Amarkantak-1 (221.83 g), Saraswahi (209.33 g), Gadarwara (205.67 g) and Amarkantak-4 (131.83 g). There was significant difference

the mean lac yield per plant in all genotypes over Amarkantak-4. The mean lac yield among Gadarwara, Saraswahi and Amarkantak-1, 2, 3 and Korsar-3 were at par (Table-5).

The productivity of lac also depends on the variety Sharma *et al*., 2018 reported 350g of lac from *C. cajan*. Earlier workers have reported the per plant yield of lac 3.74 g to 29.45 g (Kalahal *et al.,* 2017), 332.33 g to 446 g (Vajpayee *et al.,* 2019) in *C. cajan*. Thus when compared to wild lac host trees like *B. monosperma* it was 0.58 kg to 2.10 kg (Sharma *et al.,* 2015), 2.03 kg to 4.01 kg (Ghugal *et al.,* 2016) *and Z. mauritiana* 3.83 to 5.08 kg (Namdev *et al.,* 2015), the lac production from *C. cajan* shrub was quite good. There was a positive correlation between mean number of lac insect live on secondary branches per plant and the lac yield per *C. cajan* plant.

(iii) Mean weight of 100 Lac cell

The mean weight of 100 lac cells was significantly highest in Lakhnadon-2 (3.27 g) followed by Korsar-3 (3.14 g), Amarkantak-1 (3.09 g), Saraswahi (3.07 g), Amarkantak-2 (3.05 g), Amarkantak-3 (2.91 g), Gadarwara (2.79 g), TJT-501 (2.56 g), Amarkantak-4 (2.54 g) and Korsar-2 (2.43 g). There was significant difference in the mean weight of 100 lac cells in Lakhnadon-2, Korsar-3, Amarkantak-1, Saraswahi, Amarkantak-2, Amarkantak-3 and Gadarwara over Korsar-2. The mean weight of 100 lac cells among Korsar-2, TJT-501 and Amarkantak-4; Gadarwara and Amarkantak-3 as well as Amarkantak-2, Saraswahi, Amarkantak-1 and Lakhnadon-2 at par with each other (Fig. 3).

(iv) Mean weight of 100 lac cell (g)

Female lac insects are sedentary and secrete resin from its three pairs highly specialized resin glands continuously over its soft body continuous resin secretion by the lac insects over its body forms layers after layers over the insect forming protective cell. This protective cell is called lac thus each cell is produced by a single female cell. In the early adult stage of female lac insect. Wang *et al.*, (2019) observed fastest secretion of lac at the rate of 4.82 x 10^{-1} mg/d in *K. chinensis*. The weight of each lac cell has a direct relationship to the quality and quantity of phloem sap that was access to the female lac insect (Kumar *et al.,* 2017). The secretion of lac decreased gradually in the mid late adult stage of female lac insect (Wang *et al*., 2019).

Keeping this in mind if the present data it was analysed. It is observed that the mean weight of 100 lac cell was highest (3.27 g) in Lakhnadon-2 followed by, Korsar-3 (3.14), Amarkantak-1 (3.09), Saraswahi (3.07), Amarkantak-2 (3.05), Amarkantak-3 (2.91), Gadarwara (2.79), Amarkantak-4 (2.54), TTJ-501 (2.56) and Korsar-2 (2.43). This means *C. cajan* genotypes Lakhnadon-2 provides better quality and quantity of phloem sap, which may have promoted lac insect to secrete more resin. The lac production per female lac insect on Lakhnadon-2 was 0.033 g in comparison to 0.031g (Korsar-3 and Amarkantak-1).

The mean weight of 100 lac cell reported by earlier workers was 13.16 to 38.33 mg (Mishra *et al.,*1999) 2.02g to 2.12g (Engla, 2011), 2.24g to 2.54g (Janghel, 2013), 1.79g to 3.42g (Patel, 2013), 5.54g to 6.90g (Shah *et al.,* 2014), 5.18g to 6.30g (Namdev *et al.,* 2015), 3.82g to 5.18g (Ghugal *et al.,* 2015), 3.03g to 3.68g (Sharma *et al.,* 2015), 4.66g to 6.33g (Gurjar, 2016), 4.95g to 8.21g (Kumar *et al.,* 2017), 3.03 to 3.12 (Vajpayee *et al.,* 2019), 2.78 to 3.01(Patidar, 2019).

(v) Mean lac yield per 2.5 cm^2

The mean lac yield per 2.5 cm^2 slot was significantly highest in Lakhnadon-2 (1.63 g) followed by Amarkantak-2 (1.45 g), TJT-501 (1.36 g), Saraswahi (1.36 g), Amarkantak-1 (1.34 g), Korsar-2 (1.31g), Gadarwara (1.16 g), Korsar-3 (1.13 g), Amarkantak-3 (1.04 g) and Amarkantak-4 (0.75 g). There was significant difference in all genotypes over Amarkantak-4. The mean lac yield of 2.5 cm^2 slot among Amarkantak-3, Korsar-3 and Gadarwara as well as Korsar-2, Amarkantak-1, Saraswahi, TJT-501 and Amarkantak-2 were at par (Fig. 3).

(vi) Mean weight of lac (g) per 2.5 cm^2

The mean total length of sticklac was maximum 790.50 cm on Lakhnadon-2 while it was minimum 229.17 cm on Amarkantak-4 genotype. The mean weight of lac per 2.5 cm^2 was 1.33 on Lakhnadon-2 while it was least 0.45 g on Amarkantak-4 genotype. The mean weight of lac per 2.5 cm^2 reported by earlier worker it was 0.25 g to 0.97 g (Vajpayee *et al*., 2019).

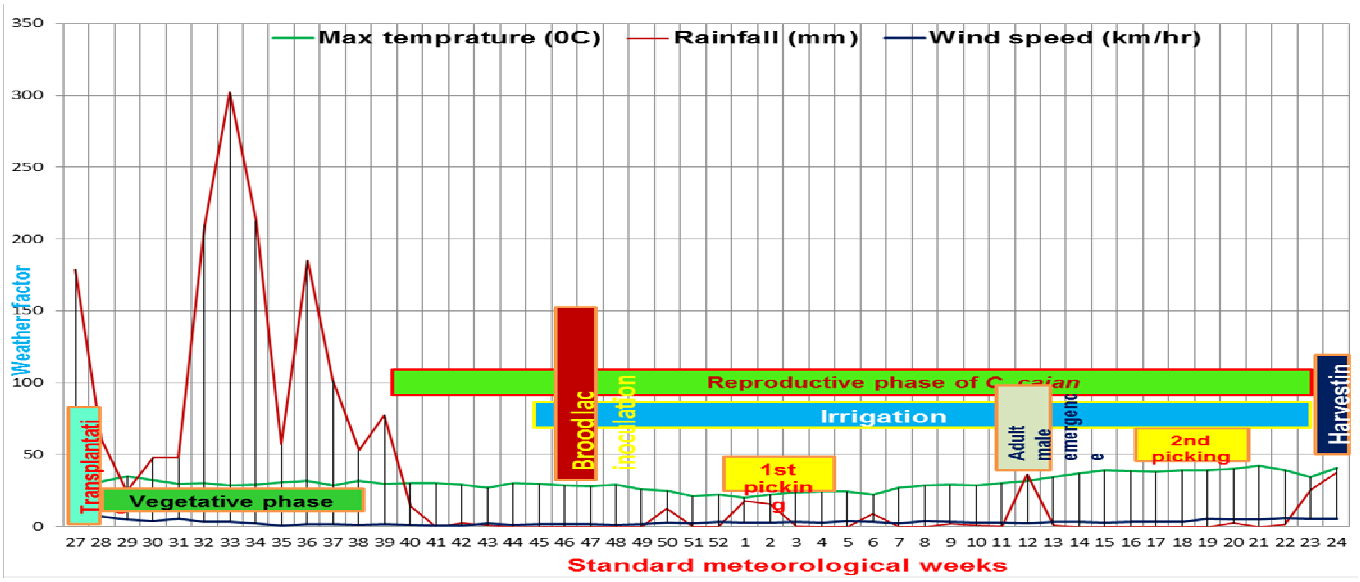

Table 1 : Details of the treatments

Genotypes	Source
T_1 TJT-501	JNKVV , Jabalpur district
T_2 Lakhnadon-2	Farmer , Lakhnadon, Seoni district
T_3 Korsar-3	Farmer , Korsar, Singrauli district
T_4 Saraswahi	Farmer , Saraswahi, Jabalpur district
T_5 Gadarwara	Farmer , Gadarwara, Narsinghpur district
T_6 Amarkantak-1	Farmer , Amarkantak, Anuppur district
T_7 Amarkantak-2	Farmer , Amarkantak, Anuppur district
T_8 Amarkantak-3	Farmer , Amarkantak, Anuppur district
T_9 Korsar-2	Farmer , Korsar, Singrauli district
T_{10} Amarkantak-4	Farmer , Amarkantak, Anuppur district

Table 2: Mean plant height (cm) of the *C. cajan* genotypes with lac insect

Treatments		Mean plant height (cm)					
No.	Genotypes	15/10/19	20/11/19	20/12/19	29/01/20	01/03/20	Increase %
T_1	TJT-501	144.83	195.17 (50.33)	209.67 (14.50)	216.50 (6.83)	218.67 (2.17)	50.98
T_2	LAKHNADON-2	127.00	171.00 (44.00)	219.00 (48.00)	228.00 (9.00)	231.00 (3.00)	81.89
T_3	KORSAR-3	133.00	180.50 (47.50)	225.17 (44.67)	240.83 (15.67)	243.67 (2.83)	83.21
T_4	SARASWAHI	129.50	162.17 (32.67)	192.33 (30.17)	202.33 (10.00)	204.83 (2.50)	58.17
T_5	GADARWARA	111.83	142.67 (30.83)	165.50 (22.83)	175.17 (9.67)	178.33 (3.17)	59.46
T_6	AMARKANTAK-1	114.83	159.50 (44.67)	197.33 (37.83)	211.00 (13.67)	213.33 (2.33)	85.78
T_7	AMARKANTAK-2	120.00	168.50 (48.50)	212.50 (44.00)	221.50 (9.00)	223.83 (2.33)	86.53
T_8	AMARKANTAK-3	117.17	166.00 (48.83)	197.17 (31.17)	209.50 (12.33)	211.67 (2.17)	80.65
T_9	KORSAR-2	123.67	152.50 (28.83)	194.00 (41.50)	210.17 (16.17)	212.50 (2.33)	71.83
T_{10}	AMARKANTAK-4	115.00	174.50 (59.50)	204.67 (30.17)	217.67 (13.00)	219.83 (2.17)	91.16
SE(M)		7.25	8.91	7.42	9.25	9.34	
CD at 5%		21.55	26.47	22.05	27.47	27.75	

Figures in parenthesis are increase plant height in cm

Table 3 : Mean number of primary and secondary branches per plant different genotypes of *C. cajan*

Treatments		Mean number of branches/plant	
No.	Genotypes	Primary	Secondary
T_1	TJT-501	3.17	9.50
T_2	LAKHNADON-2	3.00	8.83
T_3	KORSAR-3	3.33	9.00
T_4	SARASWAHI	2.33	8.67
T_5	GADARWARA	2.50	8.00
T_6	AMARKANTAK-1	2.17	6.83
T_7	AMARKANTAK-2	2.33	7.33
T_8	AMARKANTAK-3	2.50	8.17
T_9	KORSAR-2	3.50	11.17
T_{10}	AMARKANTAK-4	2.33	5.50
SE(m) ±		0.28	0.76
CD at 5%		0.83	2.27

Table 4: Mean number of primary and secondary branches per *C. cajan* plant with lac insect settlement among the different genotypes.

Treatments		Lac insect settled branches/plant	
No.	**Genotypes**	**Primary**	**Secondary**
T_1	TJT-501	72.22 (4.92)	82.39 (5.28)
T_2	LAKHNADON-2	76.39 (5.07)	92.12 (5.58)
T_3	KORSAR-3	59.72 (4.46)	79.99 (5.20)
T_4	SARASWAHI	63.89 (4.63)	74.54 (5.02)
T_5	GADARWARA	41.67 (3.67)	73.85 (4.98)
T_6	AMARKANTAK-1	61.11 (4.53)	84.58 (5.34)
T_7	AMARKANTAK-2	41.67 (3.71)	89.52 (5.50)
T_8	AMARKANTAK-3	72.22 (4.83)	78.62 (5.15)
T_9	KORSAR-2	70.83 (4.89)	79.89 (5.20)
T_{10}	AMARKANTAK-4	63.89 (4.64)	85.40 (5.37)
SE(M)		0.36	0.12
CD at 5%		1.06	0.36

Figures in the parenthesis are arc sin transformed values

Table 5: Mean lac yield per plant on *C. cajan* genotypes

Genotypes		Sticklac length (cm)	Lac yield/plant (g)	100 Lac cell weight (g)	Lac weight (g) Per 2.5 cm^2 Slot
T_1	TJT-501	647.67	340.00	2.56	1.06
T_2	LAKHNADON-2	790.50	414.50	3.27	1.33
T_3	KORSAR-3	518.17	245.17	3.14	0.83
T_4	SARASWAHI	396.33	209.33	3.07	1.06
T_5	GADARWARA	416.83	205.67	2.79	0.86
T_6	AMARKANTAK-1	488.17	221.83	3.09	1.04
T_7	AMARKANTAK-2	542.83	245.83	3.05	1.15
T_8	AMARKANTAK-3	509.50	240.00	2.91	0.74
T_9	KORSAR-2	706.33	349.33	2.43	1.01
T_{10}	AMARKANTAK-4	229.17	131.83	2.54	0.45
SE(M)		29.18	7.21	0.07	0.07
CD at 5%		86.71	21.43	0.22	0.22

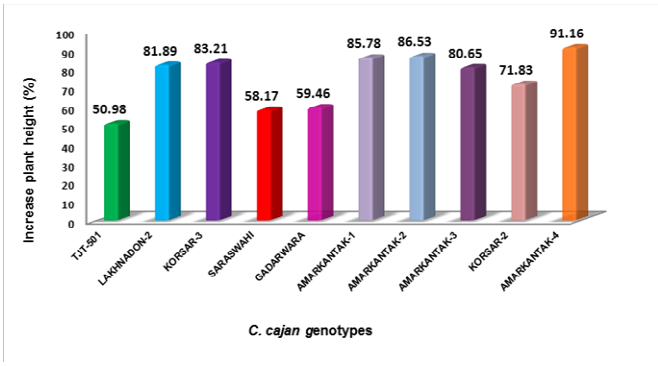

Fig. 1 : Mean plant height of *C. cajan* genotypes with lac insects between 15.10.2019 to 01.03.2020

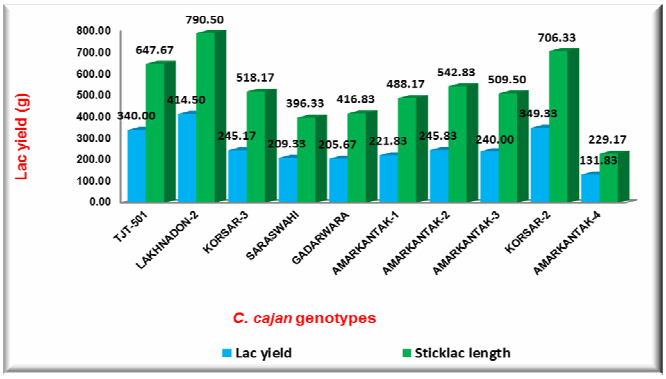

Fig. 2 : Mean length of sticklac and lac yield of *C. cajan* genotypes

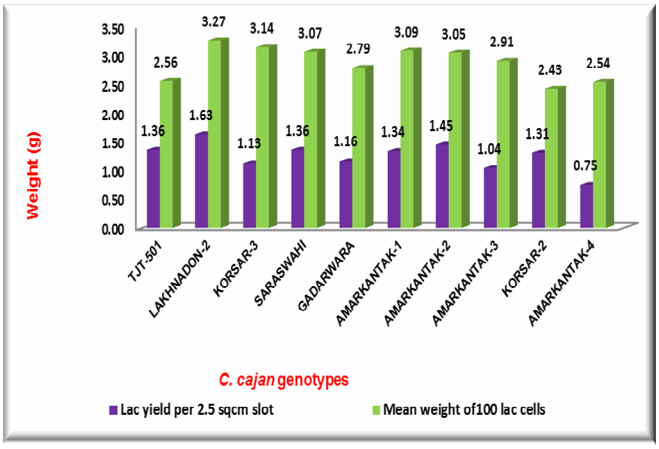

Fig. 3 : Mean weight of 100 lac cells and lac yield per 2.5 cm^2 slot on *C. cajan* genotypes

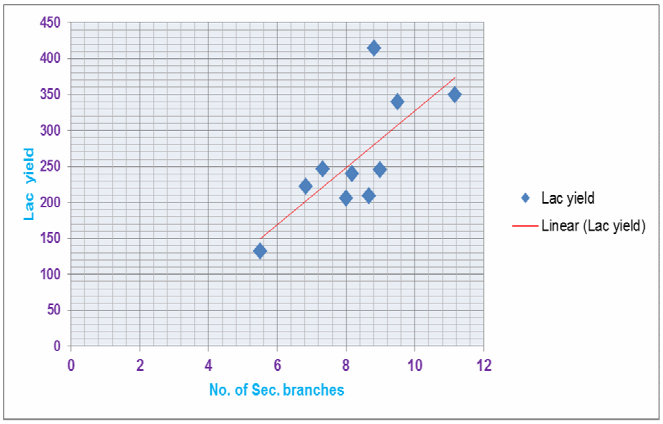

Fig. 4 : Correlation between no. of secondary branches and lac yield

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