वार्षिक प्रतिवेदन
Annual Report
2020-21

केंद्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान

केंद्रीय रेशम बोर्ड, श्रम मंत्रालय, भारत सरकार, पेज - [illegible]

Central Sericultural Research & Training Institute (CSRTI)

Central Silk Board, Ministry of Textiles, Govt. of India

CSIITI-Mysuru Organizational set-up

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ANNUAL REPORT
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केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान
केन्द्रीय रेशम बोर्ड, वस्त्र मंत्रालय, भारत सरकार, मैसूरु – 570 008
Central Sericultural Research and Training Institute
Central Silk Board, Ministry of Textiles, Government of India, Mysuru-570 008

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Contents

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Forward

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About [illegible]

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Vision

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Mission

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Mandate

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Organizational Set-up

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Training Centre

[illegible]

Infrastructure Facilities

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अनुसंधान, परिष्कृत एवं विकसित पौधिकियों के पुनरावर्त

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सामान्य प्रावधान

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निरसन

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HIGHLIGHTS OF RESEARCH, TRAINING AND EXTENSION ACTIVITIES

- vaccines were distributed based on exact BoM allowances.
- 240 multiplex germplasm were genotyped using 20 informative SSRs (IISRs at Hyderabad, Hebbal, Bengaluru, and GKVK, Bengaluru) for varietal identification and purity assessment.

In addition:

- New production facility at Hebbal, Bengaluru, was established, and 3 acres of land was developed and 10,000 sqft shed under CEA in South India. The plant capacity was 4.5 MTPA TDS/day and doubled to 9 MTPA capacity in 2 shifts. TDS/day was increased to 13.5 MTPA in existing plant with the completion of the new production facility.
- A total of seven (7) pilot production activities (public, hybrid, and private) were conducted in South India, Eastern & North Eastern India and North India. The total planting was 20,000 sqft, 40,000 sqft, 1,00,000 sqft, and 4 acres in South India, Eastern & North Eastern India and North India respectively.
- Technology developed and field validated under various agro-climatic conditions, including Kharif, Rabi, and summer seasons, in association with farmers and FPOs. Total of 6 varieties developed and tested in 3 seasons, 1 variety each in Kharif, Rabi, and summer seasons, 2 varieties in Kharif season and 1 variety in Rabi season.
- Under the evaluation of 4 elite inbred parents, 2 were released and notified.
- Under the CRP Programme, validation of the VACANTA cultivar in Andhra and Telangana states and also basic evaluation of CMS, restorer and elite inbred parents was done. Multiplication of these 11 CRP inbreds (5 CMS, 5 Restorers, CRP1 Synthetic, CRP2 Synthetic and CRP3 Synthetic) was done.
- Six distinct hybrids were established to validate the hybrid seed production protocol. These hybrids were evaluated for 4000 ePA and observed stable expression of male sterility. Seed production is underway for the production of 10 quintals of hybrid seed of ZB variety in Andhra and Telangana.
- Pilot to commercial scale production of 1 quintal of ZB variety hybrid seed was undertaken in Andhra and Telangana.
- Under the seed production activity, 1 quintal of ZB variety hybrid seed was produced in Andhra and Telangana. The seed was distributed to the farmers in Andhra and Telangana. The farmers reported that the hybrid variety performed well in the field and yielded 2.5 to 3.0 tons per acre.
- Under the seed production activity, 1 quintal of ZB variety hybrid seed was produced in Andhra and Telangana. The seed was distributed to the farmers in Andhra and Telangana. The farmers reported that the hybrid variety performed well in the field and yielded 2.5 to 3.0 tons per acre.
- Developed the seed production technology for the production of 1 quintal of ZB variety hybrid seed in Andhra and Telangana. The seed was distributed to the farmers in Andhra and Telangana. The farmers reported that the hybrid variety performed well in the field and yielded 2.5 to 3.0 tons per acre.
- Developed the seed production technology for the production of 1 quintal of ZB variety hybrid seed in Andhra and Telangana. The seed was distributed to the farmers in Andhra and Telangana. The farmers reported that the hybrid variety performed well in the field and yielded 2.5 to 3.0 tons per acre.

- The variety [illegible] was released in [illegible] and [illegible] was identified as tolerant to [illegible] based on the bioassay efficacy, number of [illegible] and [illegible] effective dose for the [illegible] of the [illegible] was also [illegible].
- [illegible] survey was carried out in [illegible] in [illegible] and [illegible] districts. The incidence of [illegible] with typical symptoms of [illegible] was observed in [illegible] and the [illegible] was recorded. The [illegible] was [illegible] in Tamil Nadu during [illegible].
- Conducted the [illegible] meeting of [illegible] monitoring committee at [illegible], [illegible]. [illegible] [illegible] [illegible] meeting, [illegible] and the team leaders of all [illegible] attended for the monitoring and [illegible] meeting [illegible].
- [illegible] and [illegible] of soil N, [illegible] was [illegible] [illegible] with [illegible] farms in [illegible] and [illegible], [illegible] farms in Tamil Nadu, [illegible] farms in Andhra Pradesh and [illegible] farmers) against the target of [illegible] farmers.
- A total of [illegible] packets of [illegible] hybrid were supplied to [illegible] for [illegible] of [illegible] [illegible]. For seed [illegible] [illegible] and [illegible], [illegible] units of [illegible] [illegible] and [illegible] units of [illegible] [illegible] were supplied to farmers from [illegible], Tamil Nadu and Andhra Pradesh. For the [illegible] period of [illegible] [illegible], [illegible] [illegible] was supplied to [illegible] of [illegible] [illegible] in [illegible] and Tamil Nadu farmers, following the introduction of the [illegible] the [illegible] [illegible] [illegible] [illegible].

[illegible]:

- A [illegible] of [illegible] [illegible] [illegible] was [illegible] through [illegible] Student Training Programme implemented in [illegible] [illegible] including [illegible] from [illegible] [illegible] of [illegible], [illegible], [illegible], [illegible], [illegible] [illegible] and [illegible] and [illegible] [illegible] [illegible] with an average [illegible] [illegible] of [illegible].
- [illegible] [illegible] were [illegible] with new [illegible] [illegible] like [illegible] [illegible] [illegible] [illegible] in [illegible], [illegible] and [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible].
- [illegible] in [illegible] [illegible], [illegible] [illegible] were sent to [illegible] [illegible] [illegible] in [illegible], Andhra Pradesh, Telangana, Tamil Nadu, Maharashtra and [illegible] in [illegible], Telugu, Tamil and [illegible].
- A total of [illegible] [illegible] including [illegible] and [illegible] visited the [illegible].
- A [illegible] training [illegible] [illegible] titled "[illegible]" [illegible] [illegible] was [illegible] and released by Dr. [illegible], [illegible], [illegible], [illegible] & Vice Chancellor, [illegible] of Agriculture Sciences, [illegible] in the [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible]

- Virtual Workshop [illegible] February 2021 with the theme [illegible]
- [illegible] implementation of [illegible] Development Project under "One District – One Product" [illegible]

Extension

- Under Capacity building and training, a total of [illegible] against the target of [illegible].
- Under Skill Training [illegible] Development Programme [illegible]
- A demonstration of [illegible]
- Demonstrated "[illegible]" [illegible]
- A total of [illegible] aspiring entrepreneurs [illegible]
- [illegible] Students from different universities attended internship/dissertation work for a period of [illegible] months.

Patents and commercialization

Patents filed

- Process for [illegible]
- A [illegible] composition and method of preparation [illegible] dated [illegible] August [illegible].

Patents granted

- Process for [illegible]
- A [illegible]
- A [illegible]

Commercialized

- [illegible]

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राजभाषा कार्यान्वयन संबंधी गतिविधियाँ

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ACTIVITIES REGARDING OFFICIAL LANGUAGE IMPLEMENTATION

...

The details of the action taken on the aforesaid Official language implementation points during the year under report is as follows:

1. ...

2. ...

3. ...

4. ...

in every quarter. During the year [illegible] Official Language Implementation Committee meetings were organized [illegible] and follow up of the [illegible] of the decisions of the meeting.

5. Organisation of Hindi Workshops: [illegible] was organised in every quarter for the employees of the Institute to provide information related to use of Hindi in the Official work [illegible] information about Official Language Policy. During the year [illegible] Hindi workshops organised in the Institute on [illegible].

6. Implementation of Noting Drafting Incentive Scheme: To encourage the officers and staff of the Institute and its subordinate offices to do their work originally in Hindi, noting/drafting incentive scheme was implemented in which cash incentives are given for writing prescribed words in Hindi. During the year [illegible] officials of the Institute and subordinate offices were awarded.

7. Publications in Hindi: [illegible]

8. Notification of the subordinate offices under rule 10(4) of the Official Language Rules: [illegible] of the Official Language Rules. [illegible] offices during the year.

9. Organisation of Hindi Pakhwada: Official Language Fortnight was organised from [illegible] to [illegible] during which Hindi competitions were organised. The winners of the competitions were awarded with [illegible] prizes. [illegible] officials for [illegible] in Hindi.

10. Hindi on Computers: [illegible] Hindi [illegible] in all computers which facilitates employees to do work in Hindi, English and other [illegible].

11. Official language inspections: [illegible] regarding implementation of Official Language Policy and necessary suggestions & guidance were extended accordingly. Besides, an Official Language Implementation Committee consisting of [illegible] members has been constituted for inspecting the Official Language [illegible] of the Institute.

12. Apart from the [illegible] copies of [illegible] were purchased and distributed to all sections and subordinate offices of the Institute.

13. Training: [illegible] were trained on various topics of [illegible] through Hindi medium in [illegible] different training programmes.

14. [illegible] were [illegible] and sent to the subordinate offices.

15. E-mail [illegible] in Hindi, more than [illegible] emails of the Institute have been sent in bilingual.

16. Bilingualisation of Website: [illegible] of the Institute has been done in bilingual (Hindi and English). Official Language [illegible] on the website to highlight the official language activities.

1. MULBERRY BREEDING AND GENETICS

On-going Research projects

[illegible]: Engineering photosynthesis in mulberry for resilience to climate change: A C4 approach (Aug. 2021 – Dec. 2023)

[illegible]

Major objective: [illegible]

Specific objectives:

- [illegible]
- [illegible] transformation and molecular characterization of transgenic [illegible] expressing C4 genes and selectable marker gene.
- [illegible] transformation and molecular characterization of transgenic [illegible] expressing C4 genes and selectable marker gene.

[illegible]

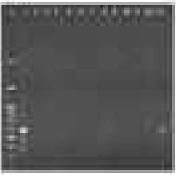

Fig. 1.1: [illegible]

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Leaf Temp. (°C)
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CD at 5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CV %	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Objectives

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- [illegible]

[illegible]

[illegible]

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CD at 5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CV %	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Objectives:

- [illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Significance		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]: [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CV%		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Significance		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Data [illegible] genotype [illegible] performance [illegible] conditions.

[illegible]: [illegible] enhancement of mulberry by genomic approach [illegible] project

Sub-component [illegible]: Development of new generation transgenic mulberry for drought stress tolerance and characterization of existing transgenic mulberry for confined field trials ([illegible] 2021 - Dec. 2023)

[illegible]

Overall objective: Development of transgenic mulberry [illegible] for drought stress tolerance and characterization of existing transgenic mulberry for confined field trials

Specific objectives:

- Development of [illegible] transgenic mulberry [illegible]
- [illegible] transgenic lines [illegible] confined field trials
- [illegible] confined field trials of existing transgenic lines

[illegible]

...gfp + ...bar+ ...nptII + ...terminator as ...kb + ...kb + ...kb + ...kb and ...gfp were ...in mature ... and ...primary ...of the putative mulberry plants [...] and ...by ... using ...gene specific primers (Fig 2.2). ...that ...in the ... mulberry plants [...] showed ...which ...with ... and ... ... and ... ... (Table 2.1).

Fig. 2.2. Confirmation of transgenic mulberry plants containing ... gene using gene specific primers: a ...kb ladder; lane 1, negative control; lane 2, positive control; Lane 3, and 4 showing transgenic mulberry plants.

Table 2.3. Physiological characterization of transgenic mulberry lines [...] under ... and ...

...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
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achievements of male mallow with equity among central sub in the experimental plots. The details of mulberry activities are to consult under the programmes and given in table 2.4.

Table 2.4: Progress of ACRS of Eastern Experimental Farm, Kalimpong

Sl. No.	Activities	Unit
1	[illegible]	Hectare
2	[illegible]	Hectare
3	[illegible]	Hectare
4	[illegible]	Hectare
5	[illegible]	Hectare
6	[illegible]	Hectare
7	[illegible]	Hectare

Table 2.5: Mulberry varieties under different experimental farm plots

Name of the variety	Germplasm type	Propagation method	Experiment conducted
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Continuous/other activities

Maintenance of mulberry germplasm, mother culture and demonstration plot

Leaves Quality Survey (Winter Spring Season) during Dec 2020 and (Autumn Season) 2021

A working germplasm unit for accessions was maintained for carrying out hybridization programmes. Germplasm of the mulberry varieties were also maintained in the demonstration plot for the benefit of sericulturists, students and other stakeholders. Activities such as cutting plant [illegible] of all mulberry varieties viz. S-54 (last age silkworm rearing), S-13 (young age silkworm rearing), V1R-2 (all moulted stages silkworm rearing), K2R-6 (late age silkworm rearing) were carried out regularly. Weeding, irrigation, application of organic manure and fertilizers, plant protection measures were undertaken for good maintenance.

Meteorological observatory

Personnel Superintendent Gr. II, Scientific Gr. IV

Observation: [illegible]

[illegible]

The meteorological observatory of Indian Meteorological Department (IMD) has been functioning in the campus and issuing records and communication to RSRS, Berhampore. The data on various meteorological parameters viz. temperature, humidity, rainfall, wind speed, sunshine hours, cloud height and evaporation, cold intensity and frost and rainfall days, thunderstorm days and [illegible] are collected daily at 8:30 AM and communicated to RSRS, Berhampore. The meteorological data is regularly collected by the scientists of this institute as well as from national meteorological centre, University of Kalyani, Nadia etc.

Meteorological data for the year [illegible]

Month	Temperature (°C)			Humidity (%)			Rainfall (mm)
	Max	Min	Avg	Max	Min	Avg	
January	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
February	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
March	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
April	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
May	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
June	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
July	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
August	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
September	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
October	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
November	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
December	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] High	[illegible]	[illegible]					
[illegible] Low	[illegible]	[illegible]			[illegible]	[illegible]	
					Total rainfall (mm)		[illegible]
					No. of rainy days		[illegible]

[illegible] MULBERRY MOLECULAR BIOLOGY

Ongoing Research projects

[illegible]: [illegible] mulberry [illegible] germplasm [illegible]

[illegible]

Objectives

- [illegible]
- [illegible]

[illegible]

Two varieties (V1 = Thailand mala, Hisar (S) = V2, Sonakshi = Bakaulibhoor 2, Hisar multiseeds = V3) were evaluated for two popular varieties (Lucknow and Punjab Wadi) and seven pretreatments (control, hot water treatment, 1% KNO3 solution, 2% KNO3 solution, 3% KNO3 solution, 4% KNO3 solution and 5% KNO3 solution) in the greenhouse condition for sowing seedlings. There was poor seed germination among the varieties (V1 = Thailand mala (T) seedlings (control) 4 = Bakaulibhoor 2 (S) seedlings) and (Hisar multiseeds 4 (H) (S) seedlings), whereas good germination rate observed in the area Hisar (S) = V1 (Bakaulibhoor 2 (S) seedlings) and (DPR Lucknow seedlings), which was good germination of plants was observed in the mean value of Punjab Wadi and Lucknow. During peak of season, some more outgrowth from the compact fruits containing seeds were observed (Hisar multiseeds 4 (H) and Hisar (S) = V1 and Hisar (DPR) (S-4) (Punjab Wadi). Physical seeds of Hisar (S) = V1 (KVK), Hisar multiseeds 4 (H) (S-4) were more popular varieties, such (Lucknow) and Punjab Wadi (Punjab). Lucknow seeds is the best for commercial seedlings in the greenhouse condition.

Table 2.1: Variety wise mean attempted seedlings raised under greenhouse conditions and established in the experimental field

Crops	No. of seeds sown (no.)	No. of seedlings raised in greenhouse conditions	No. of seedlings established in field conditions
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]

Table 2.2: Two [illegible] Varieties among Hisar (S) Hybrids among Hisar (S) Parent Varieties

Variety and pretreatments	No. of seeds sown in greenhouse conditions	V1 = Thailand mala	Punjab Wadi + Lucknow (control)	DPR = DPR (S-4)
Length of longest vine (cm)	[illegible]	[illegible]	[illegible]	[illegible]
No. of leaves in longest vine	[illegible]	[illegible]	[illegible]	[illegible]
Stem weight (g)	[illegible]	[illegible]	[illegible]	[illegible]
Root weight (g)	[illegible]	[illegible]	[illegible]	[illegible]
No. of branches	[illegible]	[illegible]	[illegible]	[illegible]
Highest survival (%)	[illegible]	[illegible]	[illegible]	[illegible]
Highest seedling (%)	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

Objective: [illegible]

[illegible]

Table [illegible]

#	Hybridization period	Crosses attempted	No. of seeds sown	No. of seeds germinated	No. of seedlings survived & transplanted to field	No. of plants survived in field
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] Development of [illegible]

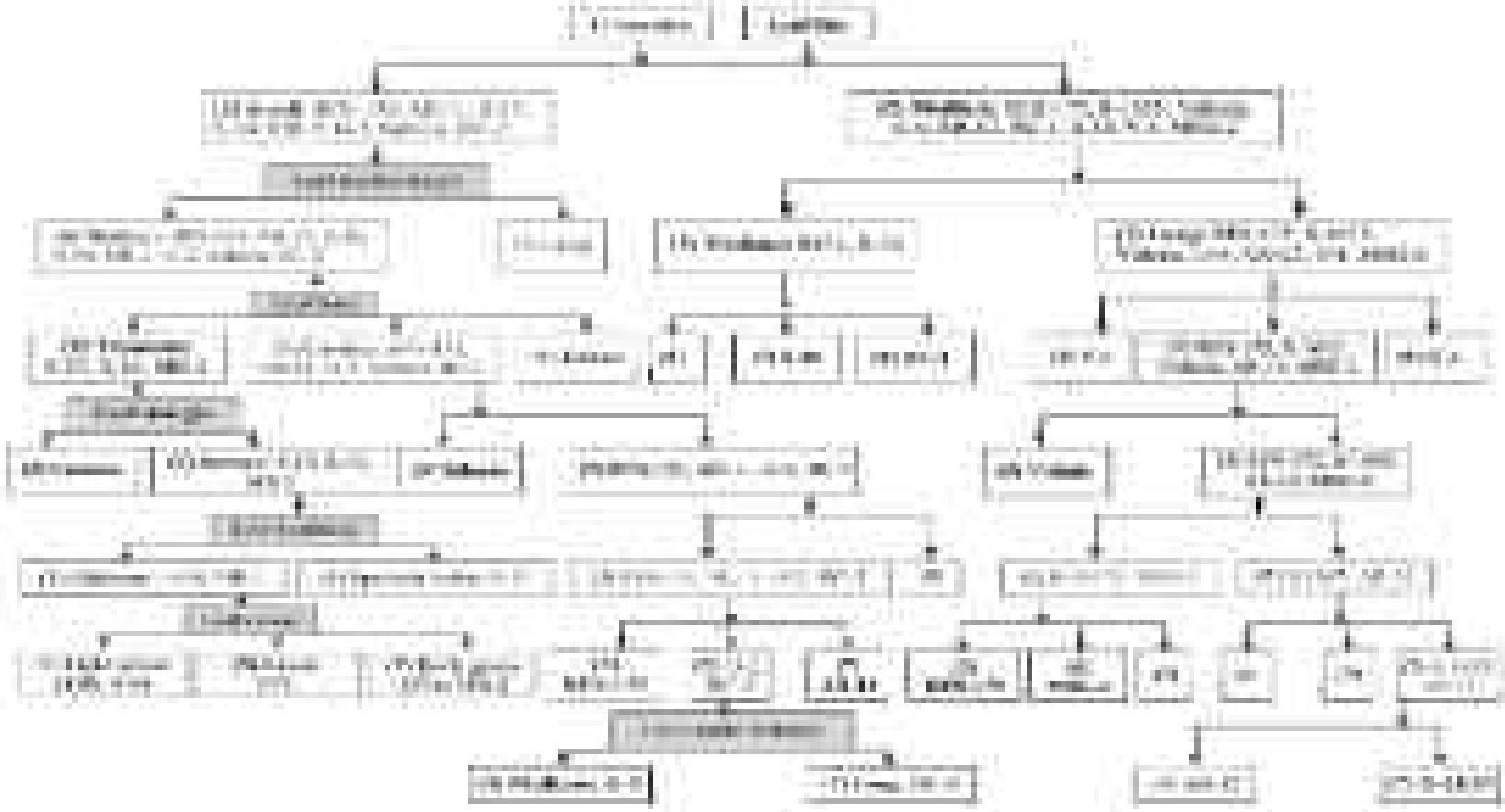
[illegible]

Objectives

- [illegible]
- [illegible]
- [illegible]
- [illegible]

Progress achieved

- [illegible]
- [illegible]
- [illegible]



- [illegible] ... [illegible]
- [illegible] ... [illegible]
- [illegible] ... [illegible]
- [illegible] ... [illegible]
- [illegible] ... [illegible]
- [illegible] ... [illegible]

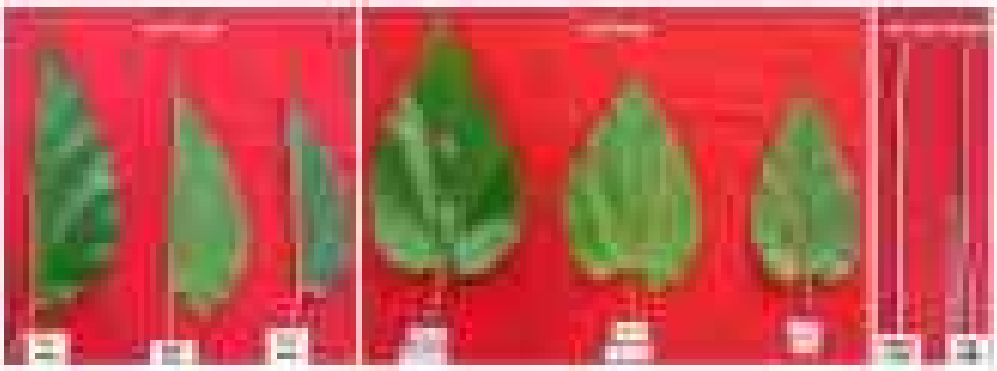
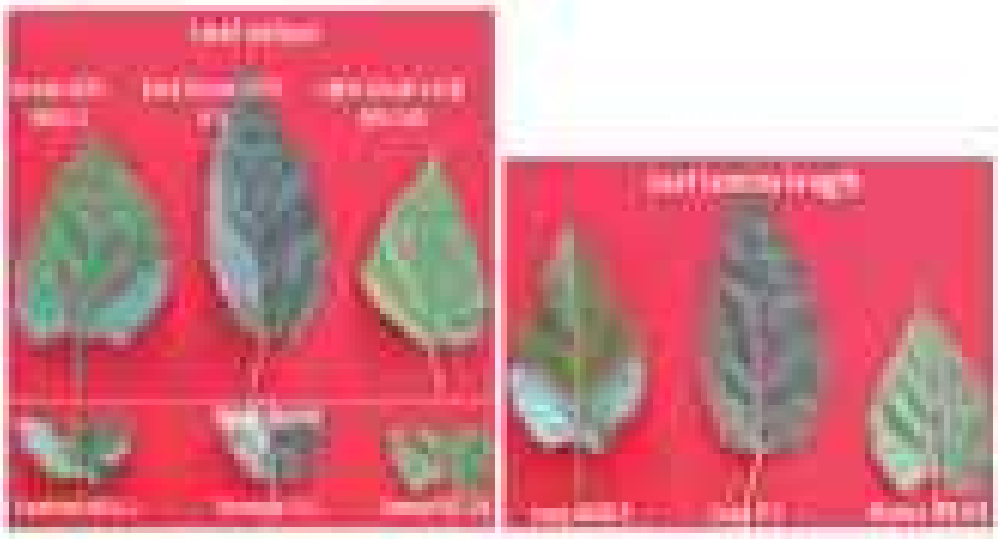
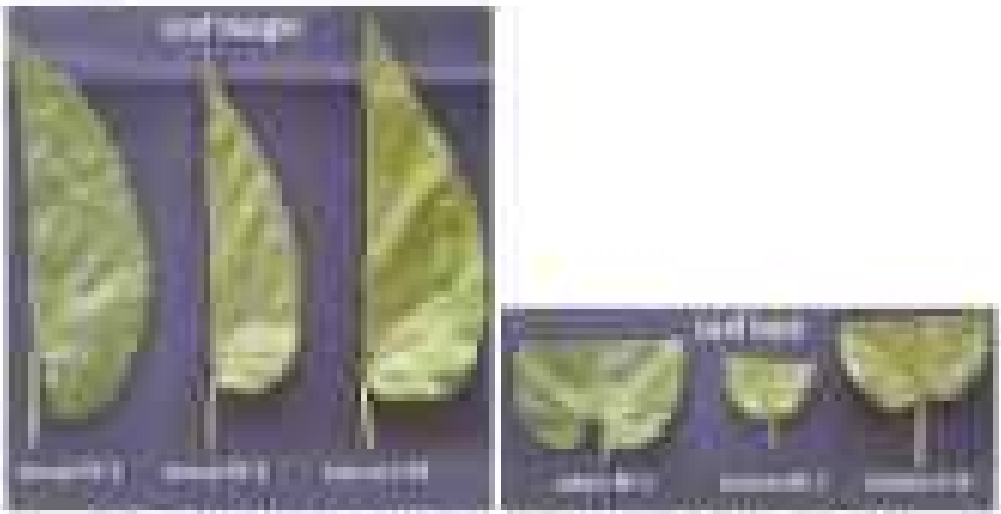
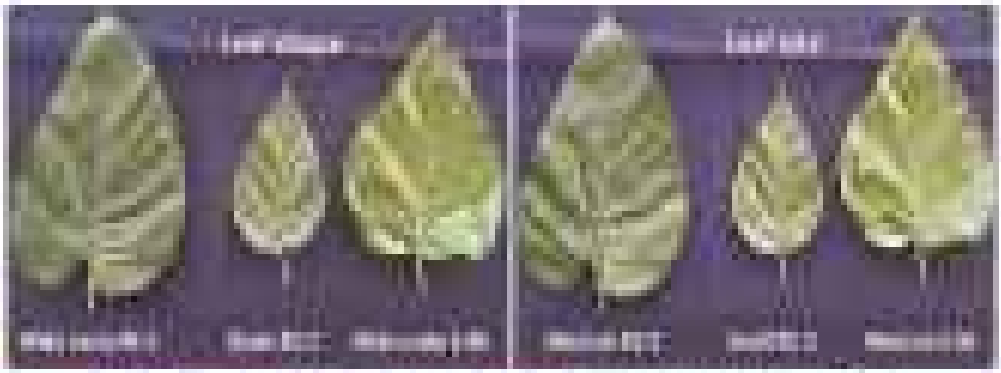


Fig. 2.2: [illegible]

Fig. 2.3a: [illegible]







[illegible] validation of a high-density SNP genotyping array for [illegible] mapping [illegible] mulberry [illegible]

[illegible]

Objectives:

- [illegible] genotyping [illegible] germplasm [illegible] mapping population
- [illegible] linkage map [illegible] markers
- [illegible] mapping [illegible]

Genotyping [illegible] mapping population [illegible] SNP [illegible]

Isolation of genomic DNA

DNA was isolated from the mapping population [illegible]

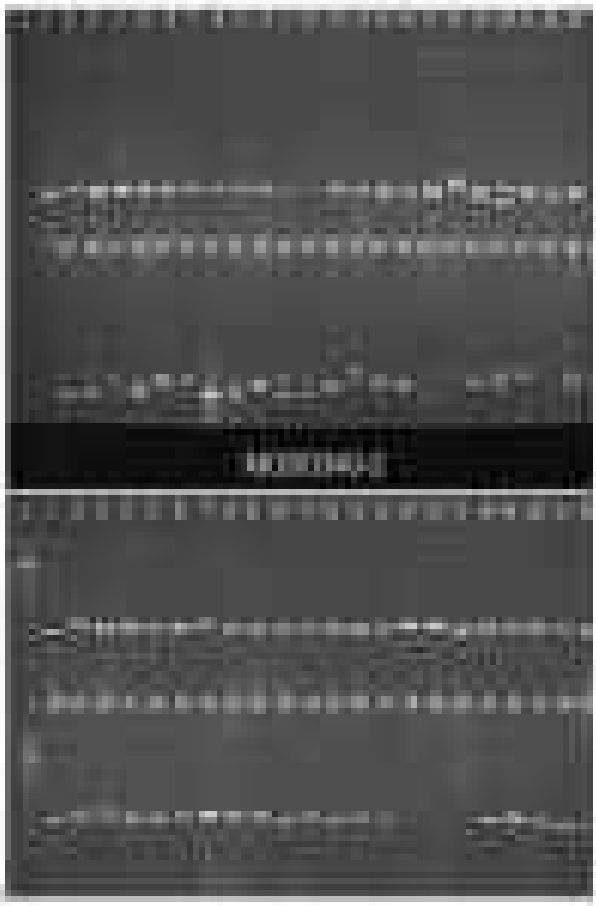
SNP genotyping

[illegible] 144 [illegible] mulberry germplasm [illegible] (Table 2.1 & Fig. 2.1).

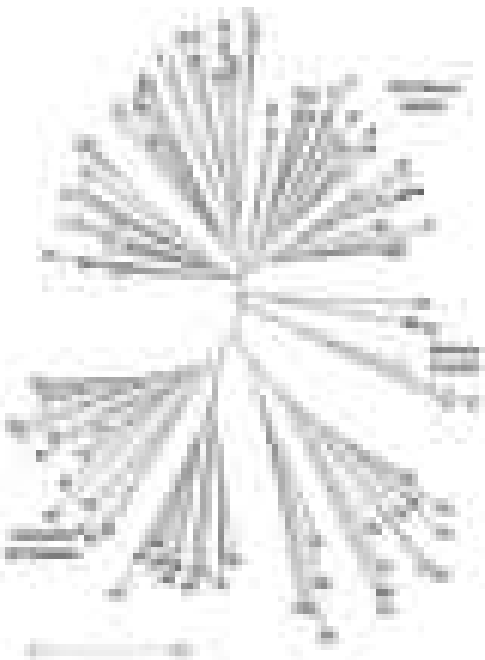
Table 2.1: [illegible] genotyping

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	17	[illegible]	33	[illegible]	49	[illegible]
2	[illegible]	18	[illegible]	34	[illegible]	50	[illegible]
3	[illegible]	19	[illegible]	35	[illegible]	51	[illegible]
4	[illegible]	20	[illegible]	36	[illegible]	52	[illegible]
5	[illegible]	21	[illegible]	37	[illegible]	53	[illegible]
6	[illegible]	22	[illegible]	38	[illegible]	54	[illegible]
7	[illegible]	23	[illegible]	39	[illegible]	55	[illegible]
8	[illegible]	24	[illegible]	40	[illegible]	56	[illegible]
9	[illegible]	25	[illegible]	41	[illegible]	57	[illegible]
10	[illegible]	26	[illegible]	42	[illegible]	58	[illegible]
11	[illegible]	27	[illegible]	43	[illegible]	59	[illegible]
12	[illegible]	28	[illegible]	44	[illegible]	60	[illegible]
13	[illegible]	29	[illegible]	45	[illegible]	61	[illegible]
14	[illegible]	30	[illegible]	46	[illegible]	62	[illegible]
15	[illegible]	31	[illegible]	47	[illegible]	63	[illegible]
16	[illegible]	32	[illegible]	48	[illegible]	64	[illegible]

65	[illegible]	85	[illegible]	105	[illegible]	125	[illegible]
66	[illegible]	86	[illegible]	106	[illegible]	126	[illegible]
67	[illegible]	87	[illegible]	107	[illegible]	127	[illegible]
68	[illegible]	88	[illegible]	108	[illegible]	128	[illegible]
69	[illegible]	89	[illegible]	109	[illegible]	129	[illegible]
70	[illegible]	90	[illegible]	110	[illegible]	130	[illegible]
71	[illegible]	91	[illegible]	111	[illegible]	131	[illegible]
72	[illegible]	92	[illegible]	112	[illegible]	132	[illegible]
73	[illegible]	93	[illegible]	113	[illegible]	133	[illegible]
74	[illegible]	94	[illegible]	114	[illegible]	134	[illegible]
75	[illegible]	95	[illegible]	115	[illegible]	135	[illegible]
76	[illegible]	96	[illegible]	116	[illegible]	136	[illegible]
77	[illegible]	97	[illegible]	117	[illegible]	137	[illegible]
78	[illegible]	98	[illegible]	118	[illegible]	138	[illegible]
79	[illegible]	99	[illegible]	119	[illegible]	139	[illegible]
80	[illegible]	100	[illegible]	120	[illegible]	140	[illegible]
81	[illegible]	101	[illegible]	121	[illegible]	141	[illegible]
82	[illegible]	102	[illegible]	122	[illegible]	142	[illegible]
83	[illegible]	103	[illegible]	123	[illegible]	143	[illegible]
84	[illegible]	104	[illegible]	124	[illegible]	144	[illegible]



[illegible]



[illegible] Unrooted dendrogram showing the genetic relationships among [illegible] evolutionary conservation based on the [illegible] dissimilarity polymorphic [illegible]

Genetic relationships among [illegible] diverse germplasm were analyzed and shown in the radial dendrogram and UPGMA cluster dendrogram (Fig. 2.2 & 2.3). The germplasm accessions were distributed in several groups in relation to their respective origin. Majority of 'J' group and mixed germplasm [illegible] among them in 'J' group. Similarly, [illegible] accessions belonging to 'Tennessee' and 'Sweet' formed a distinct group separately in both the dendrograms.

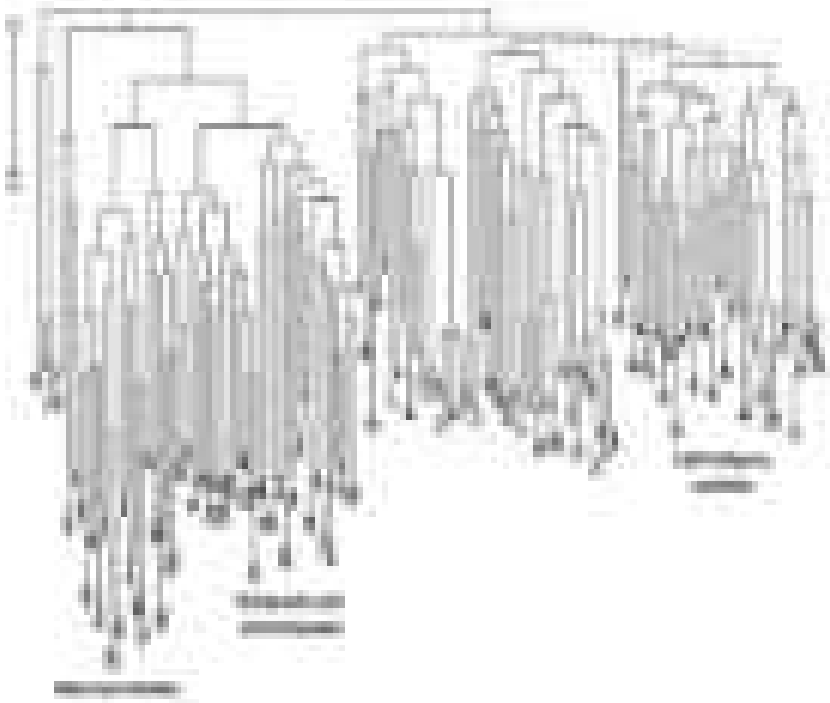


Fig. 2.3: A UPGMA cluster dendrogram showing the genetic relationships among [illegible] inbred lines based on the [illegible] dissimilarity [illegible] SSR marker loci

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

- [illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Common
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	-
-	-	-	[illegible]	[illegible]	-
-	-	-	Total	[illegible]	-

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table 2.7: Descriptive statistics for yield and growth parameters

Trait	Mean	Std. Error	Std. Deviation	Minimum	Maximum
No. of shoots/plant	10.97	0.22	4.23	2.00	22.00
Length of longest shoot (cm)	175.69	2.52	31.14	71.00	245.00
Average shoot length (cm)	107.46	2.05	23.23	60.80	225.80
No. of leaves in longest shoot	30.11	0.63	7.72	14.00	52.00
Internodal length (cm)	4.41	0.03	0.46	3.00	6.00
Shoot yield/plant (g)	[illegible]	30.68	[illegible]	100.00	[illegible]
Leaf yield/plant (g)	[illegible]	[illegible]	[illegible]	54.00	[illegible]
Hundred leaf weight (g)	232.85	7.71	113.37	19.57	[illegible]
Leaf area (cm²)	130.28	0.93	27.22	7.00	222.00
Moisture content (%)	56.59	0.27	4.21	[illegible]	[illegible]

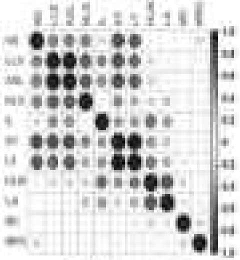


Fig. 2.12 Correlation plot

[illegible]

[illegible]

Objectives

- [illegible]

- Evaluation of segregating F2 progeny for disease resistance phenotypes
- DNA analysis for disease resistance by linkage mapping (genotypes data input from the phenotypic data)

Development of mapping populations for marker-assisted early generation selection breeding strategy

Three mapping populations namely (i) resistance parent(s) (+) x Moderately susceptible (-) with two F2 progenies, (ii) resistance (+) x resistance (+) with F2 progenies and (iii) susceptible (-) x susceptible (-) with F2 progenies were developed and established in the field. Among the three different populations established, resistance (+) x susceptible (-) with 200 F2 progenies was selected for marker-assisted early breeding strategy. Additionally, all the three populations were phenotypically yield evaluated. Approximately under progress two crop. The selected 200 F2 progenies were also evaluated for the susceptibility and tapping ability. Selection of superior F2 plants (resistant) based on the morphological characters was carried out (Fig. 4.14).

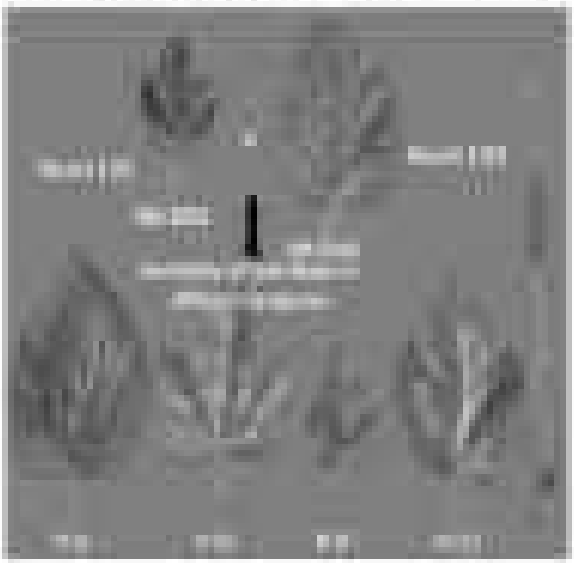


Fig. 4.14. Variability of leaf shape among F2 progenies under field conditions

Evaluation of segregating F2 progeny for disease resistance phenotypes

- Natural inoculum method of F2 progenies in the nursery beds.
- Isolates identified and characterized and maintained in pure culture.
- Inoculum multiplied and maintained the inoculums of *Xanthomonas* and *Cercospora* conditions.
- Transplanted F2 progenies from nursery beds to earthen pots after four months of growth.
- Inoculated four replications of F2 progenies with respective pathogens and experiment was conducted under glasshouse conditions.
- Regularly maintained the inoculated and uninoculated F2 progenies for disease phenotyping.
- Recorded the data on development of disease symptoms like number of healthy and affected leaves and no. of healthy and affected stems. F2 progenies were maintained in every fortnight and observations was recorded according to the disparities in resistance.
- After six months plant disease symptoms and morphological data on seed damage, shelling and insect damage were utilized as a scoring system to evaluate the reaction of progenies.

[illegible] [illegible] [illegible] [

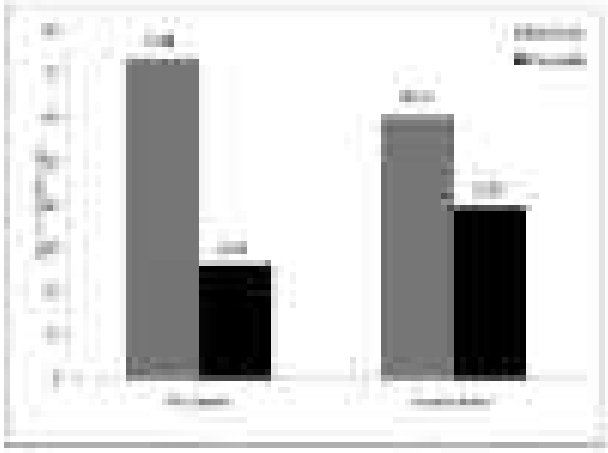


Fig. [illegible] comparison of genome distribution of [illegible] fragments among resistant and susceptible chinese [illegible] in both the seasons

[illegible] was removed by adopting the selection of trees from root as progenitor. The high quality trees selected were stored at -20°C for further use. Agarose gel electrophoresis was performed for run the amplified PCR product and DNA bands were visualized under ultra violet light. A total of [illegible] markers were used to assess the genetic relationships among multiplex and susceptible (Tellicherry type) Dalbergia latifolia trees produced the polymorphic bands between the parents. They are [illegible], monomorphic, [illegible] and [illegible] (Fig. 2.16). Among [illegible] markers studied, [illegible] Dalbergia latifolia have been undertaken in other crops by Bhattacharyya et al., [illegible] in order to understand the level of [illegible] and between the parental genotypes. The most polymorphic primers were used to analyse the [illegible] of [illegible] trees/ide. Total [illegible] markers were used for the confirmation of [illegible] among [illegible] breeding population.

Fig. [illegible] DNA markers showing the parental polymorphism

Amplification of DNA using ISSR Primers

The ISSR markers are dominant and polymorphic based on the amplification pattern of the genomic DNA when used as template for the PCR. Genetic [illegible] of [illegible] accessions and the using ISSR primers and the using thermal cycler were carried out in a [illegible] gel and the [illegible] of the [illegible] were scored for the presence [illegible] of the [illegible] and [illegible] were scored for the presence of [illegible] bands over the gel profile of the [illegible] ISSR markers [illegible] genotypes.

The number of alleles detected in the range of [illegible] markers were [illegible] accessions ranged from [illegible] alleles with the marker [illegible] (also known as the least number of alleles per locus (Fig. [illegible]). While [illegible] markers showed [illegible] alleles per locus and [illegible] and [illegible] showed [illegible] alleles per locus (Fig. [illegible]).

[illegible] [illegible] [illegible] [

Table 3.6: Study area of forests (Dense multilayered and moderately dense) Dhaulkot Range with respective administrative [illegible] forest

[illegible]	[illegible]	
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

The most and female adult participation of different markets have been analyzed in different categories. The data has been mentioned in Table 3, which was obtained by interviewing participants method. The GIS method which supported the progress as forest governing, have given in [illegible] (Table 3.7).

Table 3.7: Investigation results showing area in forest plant type with respective specific market

Markets used in [illegible]	Percentage of female participant [illegible] (%)	Percentage of male participant [illegible] (%)	Percentage of interest participant [illegible] (%)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]

- [illegible]
- [illegible]

[illegible]

[illegible]

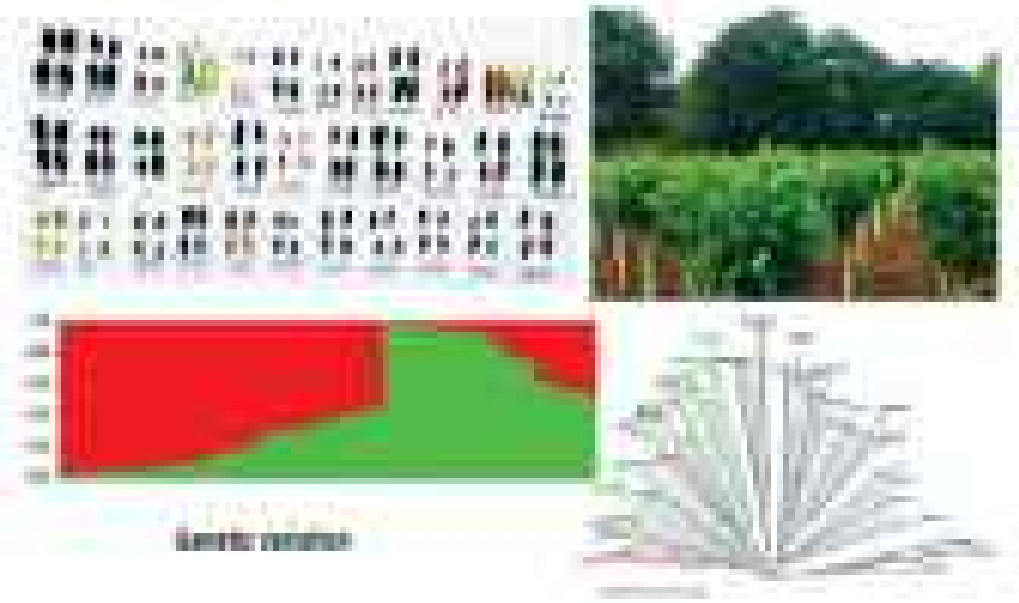
Table [illegible]

#	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	M. [illegible]	[illegible]	[illegible]			
2	M. [illegible]	[illegible]	[illegible]			
3	M. [illegible]	[illegible]	[illegible]			
4	M. [illegible]	[illegible]	[illegible]			
5	M. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
6	M. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
7	M. [illegible]	[illegible]	[illegible]			
8	M. [illegible]	[illegible]	[illegible]			
9	M. [illegible]	[illegible]	[illegible]			
10	M. [illegible]	[illegible]				[illegible]
11	M. [illegible]	[illegible]	[illegible]			
12	M. [illegible]	[illegible]	[illegible]	[illegible]		
13	M. [illegible]	[illegible]		[illegible]		
14	M. [illegible]	[illegible]	[illegible]			
15	M. [illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]				

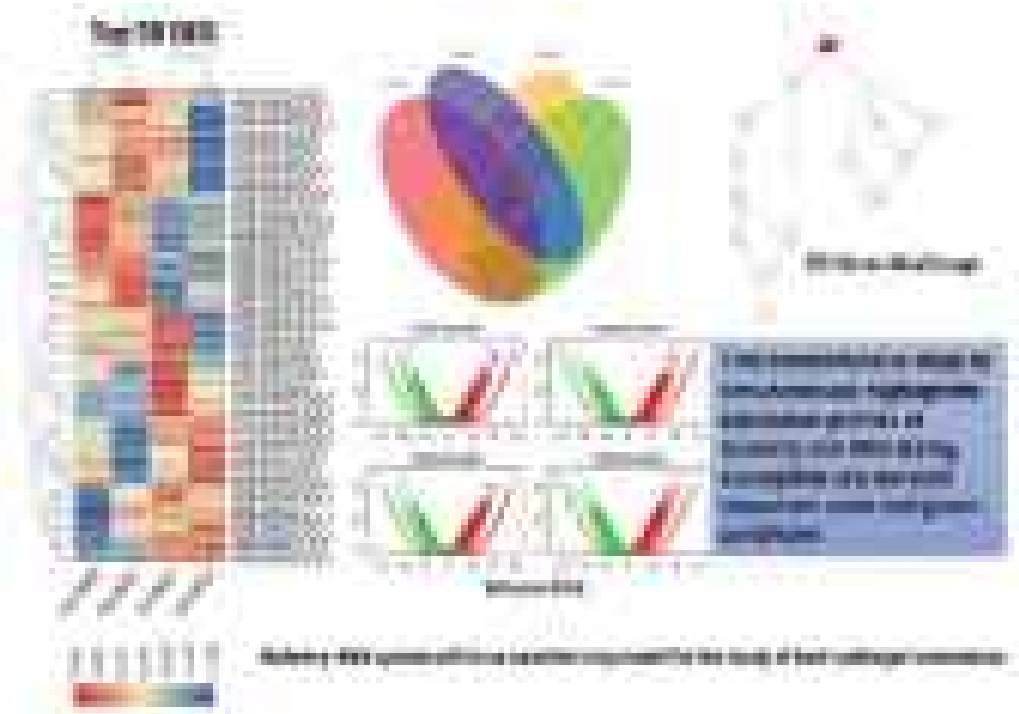
[illegible]

identification and validation for pathogenicity. The identification was conducted with morphological and molecular tools such as species specific PCR and DNA sequencing of the internal transcribed spacer (ITS). Data collection and inoculation of plants in fields (n=150 ea) but this season is insufficient to do field evaluation as Fusarium species sensitive to cool weather (Leslie and Summerell, 2006). Phylogenetic analysis based on TEF and ITS sequences of the isolates showed that most belonging to the same species and mostly clustered in the same clade. The result of this study exhibits the existence of DF species of fungi including Fusarium species complex (sambucinum, incarnatum, chlamydosporum, oxysporum and the occurrence of some pathogenic and opportunistic species associated with the root rot of faba bean (Abdel-Aziz, 2020). This is the first documented study on molecular phylogeny, identification and pathogenicity of root rot associated fungal pathogens in Ethiopia and also the first report of the Fusarium species complex.

An efficient and reliable screening method was developed to evaluate the disease reaction germplasm accessions for the development of cultivars resistance to root rot. Detached seedling stem (DSS) and root dip (RD) method of inoculation was found to be effective for large scale screening of faba bean accessions and breeding materials for identification of resistant [illegible]. The isolates accession no. MF[illegible] which is an endophytic fungi was found to be highly virulent consistently against root rot causing and wilt accessions and found to be fairly virulent to moderately virulent on both evaluation methods. Generally this research finding has provided high amount of information's about the pathogenicity, virulence, host range, host specificity against root rot causing and wilt causing pathogens, effect and sensitivity of fungicides, pathogenicity test, host resistance screening methods, fungicide sensitivity test, biocontrol agents and fungicides, isolates characterization, host resistance screening, fungicide evaluation



[illegible]



[illegible]

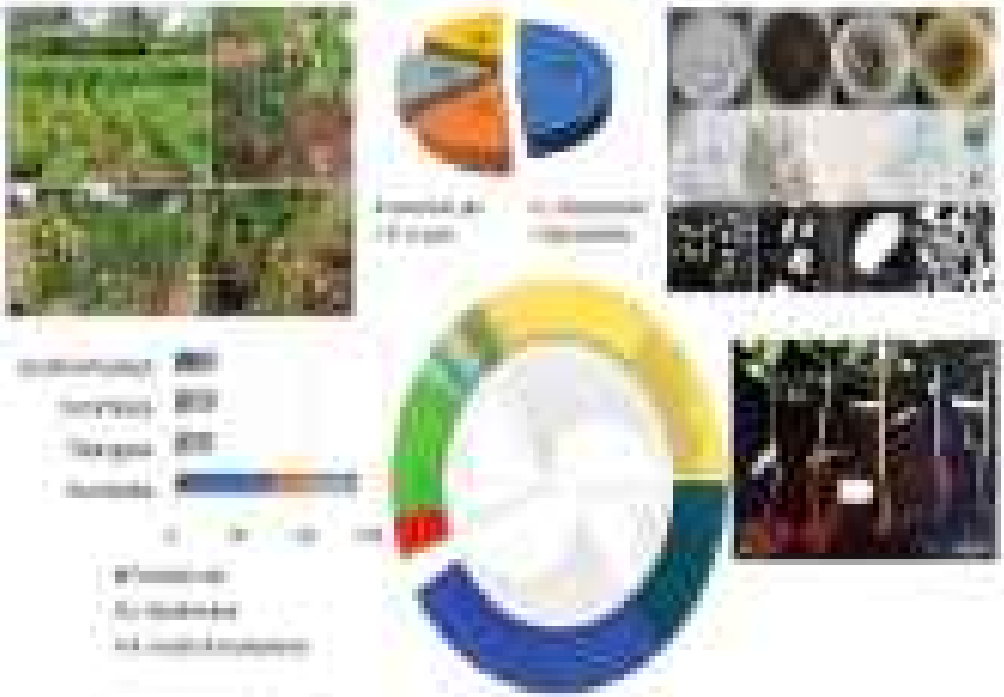


Fig. 3.22 Distance-dependent quantification and pathogenicity of fungal pathogens associated with root rot Acidithiobacillus ferrooxidans

Fig. 3.23 Automated tagging of metagenomic ancillary genes using aggressive mode by Prokka

3. SOIL SCIENCE & CHEMISTRY

Ongoing Research Projects

[illegible]: Genetic enhancement of Mulberry through [illegible] and identification of [illegible] for nutrient use efficiency [illegible] (Sep. 2022 - Dec. 2025)

[illegible]

Objectives

- To evaluate the [illegible] of diverse mulberry genetic resources for uptake and utilization efficiency of Nitrogen, Phosphorus, Zinc and Sulphur
- To identify [illegible] for nutrient use efficiency and associated traits [illegible] germplasm [illegible] mulberry research programmes

[illegible]

[illegible]: Development of [illegible] for production of [illegible] (Sep. 2022 - Jan. 2025)

[illegible]

Objectives

- [illegible]
- [illegible]
- [illegible]

Specific objectives: [illegible]

...

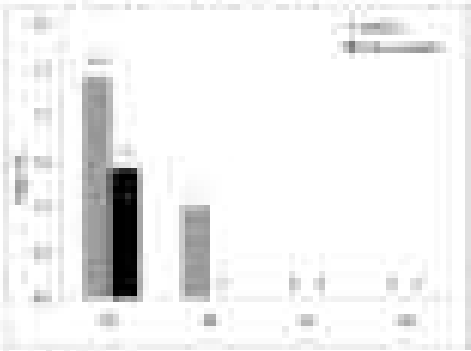


Fig. 3.3. Analysis of heavy metals before and after phytoremediation of soil

...

Discussion

Bioassay was conducted using mulberry leaf produced from organic garden as well as from conventional farming. In the silkworm rearing trial, analysis clarified that heavy metal in worm faeces was found to be considerably less than the metal present in the organic leaf rearing. (Mondal, 2016). Heavy metal contents in the silkworm samples were analysed for the presence of heavy metals. Even though the presence of heavy metals was recorded in the organic garden soil, in the leaf, it was found that the presence was comparatively less. In the case of organic cocoon, it was within the acceptable limit. It was observed that the heavy metals that are existing from soil through leaf to the silkworm finally reaches to cocoon (Table 3.4). Heavy metals such as Nickel, Lead, Cadmium, Arsenic, Mercury and Chromium are considered more poisonous to the heavy metals and Pb ions is more above permissible limit (WHO, 2011).

Table 3.4. Occurrence of heavy metals in soil, leaf, cocoon and silkworm samples

Heavy metals	Soil (Organic garden)	Leaf (Organic)	Cocoon (Organic)	Cocoon (Control)	Soil	Leaf
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Pb	0.39	0.05	0.05	0.14	0.1	BDL
Cd	0.01	BDL	BDL	BDL	BDL	BDL
As	0.03	BDL	BDL	BDL	BDL	BDL
Hg	0.04	BDL	BDL	BDL	BDL	BDL

Source: Mondal (2016)

Table 3.5. Heavy metals in mulberry leaf and cocoon

Heavy metals	Soil	Mulberry leaf	Cocoon
	mg/kg	mg/kg	mg/kg
Pb	1.9	0.1	0.1
Cd	0.1	0.1	0.01
As	BDL	BDL	1.00
Hg	BDL	BDL	BDL

...

...

...

...

...

Table [illegible]: Composition of nutrient solution for [illegible] experiment

[illegible]	[illegible]		
[illegible]	[illegible]		
Element	ppm	Element	ppm
N	[illegible]	Fe	[illegible]
P	[illegible]	Mn	[illegible]
K	[illegible]	Zn	[illegible]
Ca	[illegible]	Cu	[illegible]
Mg	[illegible]	B	[illegible]
S	[illegible]		

Continuing/Other Activities

Quality Testing of [illegible] and inputs used in agriculture

[illegible]

Table [illegible]: [illegible] analysed and revenue generated

[illegible]	No. of samples	Amount Generated (Rs)
Soil	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]

* [illegible]

4. AGRONOMY

Ongoing Research Projects

[illegible]

[illegible]

Objectives

* [illegible]

[illegible] [illegible] [illegible] [

[illegible] Development of an agronomical package for tree mulberry cultivation for wide acceptance among the sericulturists of Southern India (Nov 2020- Oct 2023)

[illegible]

Objectives

1. To evaluate the optimum requirements of nutrients for mulberry under rainfed condition
2. To work out the nutrient economics of the mulberry under rain fed condition

In pursuit to the significant requirements of nutrients for sustainable growth and leaf productivity under rain fed mulberry cultivation, the experiment was initiated with farmers' participatory mode in three locations viz., Kadiduru (Channapatna taluk) and Kadirenahalli (Kanakapura taluk) of Ramanagara district and Kalkere (Magadi taluk) of Bengaluru rural district. Soil and leaf samples collected at the time of planting and harvest of the crop were analysed in the laboratory and nutrient requirements for the study.

[illegible] Rain water harvesting through diametrical silt retention pond model for sustainability (Oct. 2020 - Nov. 2023) Collaborative Project with UCN, Bengaluru

[illegible]

Objectives

1. To develop silt pond model for harvesting rain water in the plateau region of Southern India
2. To evaluate the economics of silt pond model in comparison with farm pond
3. To study the recoverability of nutrients and soil moisture in the silt pond

The silt pond model developed in the [illegible] Bengaluru was evaluated for harvesting runoff in different treatment combinations in the demonstration to study the recoverable quantities of silt ponds for a period of 9 months. It was observed that 30 t silt could be recovered in one of the treatments. However, it is observed that [illegible] of silt in certain circumstances. Economic analysis revealed that [illegible] of silt pond was economical followed by [illegible] of silt pond.

Landscaping/Other Activities

1. Engaged research scholars/students under different training programmes
2. Maintained [illegible] as a model in agroforestry
3. Maintained the arboretum/plant museum/seed units for conservation

V. RESEARCH PROJECTS

On-going Research Projects

[illegible] Genetic enhancement of mulberry for economic sustainability (Multi Locational Research Project)

Collaborators: AICRP, Directorate of [illegible] Research, Hosur

Duration: [illegible]

Objectives

1. To develop a procedure for identification of the seed of choice as an alternative for drought escape in mulberry
2. To identify QTLs for drought adaptive traits by association mapping

[illegible]

Rankings of diverse germplasm accessions (DGA) were manipulated in rank structures (ranked structures) in exploratory designs and translated by the following scale for 1st season. Morphologic data were recorded on three diverse germplasm parameters viz., chlorophyll, reproductive sway, specific leaf weight, leaf area and number of stomata. Overall assemblage (shoot length, shoot weight, leaf weight, stalk neck and helix number of roots, root weight, length and weight of tangible root, root) were assessed on three germplasm chlorophyll and carotenoid per cent (CCPP) showed variation among the hydrous germplasm accessions and chlorophyll [illegible] readings ranged from [illegible] and assessed stay-green ranged from [illegible] (Fig. [illegible]) stomata frequency and dynamic variation among the hydrous germplasm accessions [illegible] during [illegible]. Specific leaf area and leaf matter (tree weight per leaf weight basis) during tangible root length, crown and [illegible] also showed variation among the germplasm. Rankings of diverse germplasm accessions were tested in nursery (1st) and for estimating phenotyping activity the 1st season.

Trait	Mean	SE	SE	[illegible]	Min.	Max.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Fig. [illegible] Variation of [illegible] was recorded in three [illegible] hydrous accessions (1st season)

Trait	[illegible]	SE	SE	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Fig. [illegible] Variation in root weight of diverse germplasm accessions (1st season)

[illegible] Remarks

The major emphasis of this project is to enhance the potential productivity of the dietary legume by improving its yield potential to cope up with harvesting index ratio. To achieve this, diverse set of 200 mulberry germplasm accessions were being assessed for drought adaptive traits. The germplasm accessions planted in randomized complete block design at two locations (CSRTI, Mysuru and [illegible] Bangalore) for various physiological parameters such as relative water content, membrane stability index, [illegible], leaf canopy temperature and chlorophyll content. The example, phenological parameters such as days

[illegible]

[illegible]

Sub-project [illegible]: Comparative quantitative and qualitative analysis of secondary metabolites for identification of biomarkers responsible for leaf quality in mulberry (In collaboration with CSIR-National Chemical Laboratory (NCL), Pune; [illegible])

[illegible]

Objective:

- [illegible]

CSRTI, Mysuru

[illegible]

[illegible]

CSR&TI, Pune

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

Ongoing Research Project

[illegible]

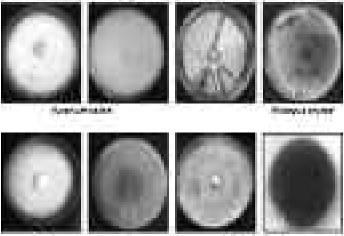
[illegible]

Objectives

- [illegible]
- [illegible]
- [illegible]
- [illegible]

Progress of the project

- [illegible]
- [illegible]
- [illegible]
- [illegible]



Fusarium solani　　Rhizopus oryzae

Fusarium oxysporum　　Lasiodiplodia theobromae

Fig. 5.1: Mulberry root rot fungal pathogens

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

Concluded Research Projects

[illegible]

[illegible]

Objective: [illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UAS, Bangalore	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total/Average	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

Table 4.2: Performance of [illegible] at harvest Year

State	No. of [illegible] reported	No. of farmers reported	Value of [illegible] (Rs in lakh)	[illegible] (Rs)	[illegible] (Rs)	[illegible] (Rs)	[illegible] (Rs)
Karnataka	[illegible]	946	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Andhra Pradesh	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tamil Nadu	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maharashtra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 4.3: Performance of [illegible] (Control) at harvest Year

State	No. of [illegible] reported	No. of farmers	Value of [illegible] (Rs in lakh)	[illegible] (Rs)	[illegible] (Rs)	[illegible] (Rs)	[illegible] (Rs)
Karnataka	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Andhra Pradesh	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maharashtra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total / Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 4.4: Performance of [illegible] during different seasons

State	Season	No. of [illegible]	No. of farmers	Value [illegible] (Rs in lakh)
Karnataka	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
Total / Average		[illegible]	[illegible]	[illegible]
Andhra Pradesh	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
Total / Average		[illegible]	[illegible]	[illegible]
Tamil Nadu	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
Total / Average		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	—	—
[illegible]	[illegible]	[illegible]
[illegible]		
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	—
[illegible]	—	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]

Sl.	[illegible]	Karnataka ([illegible] samples)	Andhra Pradesh ([illegible] samples)	Tamil Nadu ([illegible] samples)
1	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
3	Standard deviation	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Table [illegible]

State	No. of farmers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Karnataka	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Andhra Pradesh	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tamil Nadu	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maharashtra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Percentage		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

Objectives

- [illegible]
- [illegible]
- [illegible]

[illegible] [illegible] [illegible] [

Table 5.11. Results summary of ANOVA between accessions

	Source DF	Model DF/Error DF/C.V.	F Value	Pr > F	Root MSE	R-Square	Coeff Var	Mean	Std Dev	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	0.11	1.40	0.001	17.10	0.68	0.11	1.40	19.11	0.0000	0.0000	0.0000	17.10
Error	2.00	0.00	17.10	0.0000	0.0000	0.00	0	1.40	0.0	0.00	0.00	0	0
Total	2.00	0.00	17.10	0.0000	0.0000	0.00	0	1.40	0.0	0.00	0.00	0	0
DF	7.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
CM	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P Value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Fig. 5.11. Principal component analysis of the different accessions

Analysis of variance is as in Table 5.11 significant differences among the accessions of the germplasm studied, in particular for number of tillers per plant, number of productive tillers per plant, panicle length, flag leaf length, flag leaf width, grain yield per plant, 1000 grain weight, days to 50% flowering, days to maturity, number of grains per panicle, and grain yield per plant. Principal component analysis (PCA) was performed to find out the most contributing traits to the variation among the accessions. The first two principal components (PC1 and PC2) explained 68.3% of the total variation. The first principal component (PC1) explained 38.2% of the variation and was associated with traits such as plant height, panicle length, flag leaf length, and grain yield per plant. The second principal component (PC2) explained 30.1% of the variation and was associated with traits such as number of tillers per plant, number of productive tillers per plant, and 1000 grain weight. The PCA biplot (Figure 5.11) showed that the accessions were distributed in four quadrants, with accessions in the same quadrant having similar trait profiles. For example, accessions in the upper right quadrant had tall plants, long panicles, and high grain yield, while accessions in the lower left quadrant had short plants, short panicles, and low grain yield. The PCA biplot can be used to identify accessions with desirable trait combinations for breeding purposes.

Hierarchical cluster analysis was performed to identify the clusters of the 100 different germplasm based on the quantitative traits such as plant height, panicle length, flag leaf length, flag leaf width, grain yield per plant, 1000 grain weight, number of tillers per plant, number of productive tillers per plant, days to 50% flowering, and days to maturity. The Euclidean distance and Ward's method were used to construct the dendrogram. The dendrogram was then cut at a height of 10 to obtain the clusters. The mean values of the traits for each cluster were calculated and compared using analysis of variance (ANOVA) followed by Tukey's HSD test at a significance level of 0.05. The results showed that the clusters differed significantly for most of the traits studied. Cluster 1 had the highest mean values for plant height, panicle length, flag leaf length, flag leaf width, grain yield per plant, and 1000 grain weight, while cluster 3 had the lowest mean values for these traits. Cluster 2 had intermediate values for most of the traits. The number of tillers per plant and number of productive tillers per plant were highest in cluster 4, which also had the earliest days to 50% flowering and days to maturity. Cluster 5 had the latest days to 50% flowering and days to maturity, but had relatively low values for plant height, panicle length, flag leaf length, flag leaf width, grain yield per plant, and 1000 grain weight. The results of the cluster analysis can be used to select accessions with desirable trait combinations for breeding purposes. For example, accessions from cluster 1 could be used to develop high-yielding varieties with long panicles and large grains, while accessions from cluster 4 could be used to develop early maturing varieties with high tillering ability.

Fig. [illegible]: Dendrogram constructed by Ward's method using Euclidean distance by hierarchical clustering of alfalfa [illegible]

Genotyping of alfalfa [illegible]

A SSR marker based genotyping to understand diversity and population structure, [illegible] SSR markers (Table [illegible]) was analysed and genotyped [illegible] alfalfa germplasm. Based on the scoring data, a binary matrix [illegible] was tabulated using the Dice's dissimilarity coefficient with the help of the software [illegible]. Genetic differentiation parameters such as number of alleles (na), observed heterozygosity (Ho), expected heterozygosity (He) and polymorphic information content (PIC) were calculated for [illegible] markers. In the present scoring pattern, the bands were scored based on their size. The presence/absence were scored from each marker and these data were subjected to structure analysis using STRUCTURE programme (Pritchard, Stephens & Donnelly, 2000) to evaluate the population structure. The fixation index (Fst) for each sub population by the best 'K' was estimated by the STRUCTURE software. Twenty SSR markers were polymorphic with mean allele number of [illegible], polymorphic information content (PIC) of [illegible] and gene diversity of [illegible].

Table [illegible]: Genetic differentiation parameters i.e., number of alleles (na), observed heterozygosity (Ho), expected heterozygosity (He) and polymorphic information content (PIC)

Marker	number of individuals (n)	number of alleles observed (na)	observed heterozygosity (Ho)	gene diversity (He)	Polymorphic information content (PIC)
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	7	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	7	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]

Structural analysis about most of the genotypes into two populations with manual checks among the alleles. The allele frequency divergence of the primary constraint between the two subpopulations, the expected heterozygosity in subpopulation 1 was 0.71, in the subpopulation 2 expected expected heterozygosity of 0.69. The high distance (FST) the membership, highly recommend showing different genotypes (Dwyer, 1984 [12]). Based and more quantitative traits showing alleleome (Shirasu-Hiroma, 2017) are represented in clusters with observable diversity, explain only belief in subpopulation 1 is present in subpopulation 2 is to which shows the distribution of alleleome genotypes in two clusters with mixed ancestry in them area.

Multiplex-based genotyping (PAS) method: genomic was isolated from the silk extracted from the progenies was carried out using CTAB method. After isolation the DNA samples are subjected to Quality Check. Total DNA of each sample was quantified by using Agarose (0.7%) in Tris-borate-EDTA agarose gel (Fig. 3.4.1 and 3.4.2).

Fig. 3.4.1: Agarose gel quantification of the genomic DNA isolated from alleleome (S1-S7) to make the sample loading

DNA alleleome sequencing was carried out using Illumina HiSeq 2500 at 75 million of reads each (raw by paired end reads) and sequencing results contained a total of data in such size considerably. Read alleleome with multiplicity about the reads 200+ reads with multiplicity 200 times.

Alleleome site annotation mapping

The mapping control comprising 100 alleleome to study with 10 traits and 1000 cells. 5x5 plots in sub-field mean of the traits follow the normal distribution bar (Fig. 3.4.2).

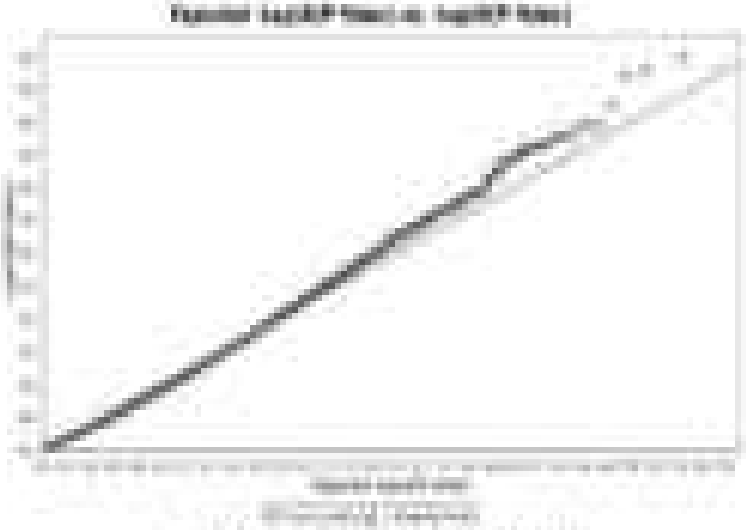


Fig. 3.4.2: (a) genome map, (b) mean weight

[illegible] [illegible] [illegible] [

Fig. 2.7 [illegible] mapping

[illegible]

[illegible]

[illegible]

Ongoing Research Projects

[illegible]

[illegible]

Objectives:

- [illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]		[illegible]	[illegible]			
[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] Transcriptome analysis of midgut samples at 3rd, 5th and 7th day of third instar silkworms inoculated with bacteria, virulent and avirulent, was carried out. Uninoculated healthy silkworms were considered as control. Total RNA of each sample was extracted using [illegible] method. After validation, the RNA samples were subjected to Illumina HiSeq. Total [illegible] of each sample was quantified and qualified by using RSEM [illegible] and DESeq2 R [illegible] software. Gene ontology enrichment analysis was performed on differentially expressed genes. Sequencing data were compared between control and treatment. Pathway is known as [illegible] which is mainly observed, [illegible] and one pathway was shown to be significantly upregulated (Table 4.2.2; Fig. 4.2) which are involved in [illegible] [illegible] [illegible]

[illegible]

[illegible]

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[illegible]

- [illegible]
- [illegible]
- [illegible]

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[illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

Pilot Study

[illegible]

[illegible]

Objectives

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Objectives

- [illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Evaluation of newly developed silkworm double hybrids of Mulberry [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible]

* [illegible]
* [illegible]
* [illegible]
* [illegible]

[illegible] [illegible] [illegible]

Table [illegible] [illegible]

Hybrid	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible] [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible] [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table [illegible]

[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SATELLITE [illegible] BREEDING STATION [illegible]

[illegible]

[illegible]

[illegible]

Production and supply of dfls to [illegible]

- [illegible]
- [illegible]

Production of [illegible]

[illegible]

Revenue Generation

During the reporting period [illegible] revenue was generated.

[illegible]

[illegible]

[illegible]

Objectives

- [illegible]
- [illegible]

[illegible]

Table [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Table 3.4.1 (Chs production of Pl tissue)

Month	Qty. of fruit harvest (Kg/tree)	Qty. of fruit produced (Kg)	Egg recovery (%)	Pl (Chs) collected (Kg)
June 2021	[illegible]	1441	[illegible]	[illegible]
September 2021	[illegible]	1671	[illegible]	[illegible]
December 2021	[illegible]	1257	[illegible]	[illegible]
March 2022	[illegible]	1265	[illegible]	[illegible]
Total	[illegible]	5941	[illegible]	[illegible]

During the period under report, [illegible] stem cuttings supplied to [illegible] which in turn [illegible] in four [illegible] of [illegible] of horticultural [illegible] of the trees [illegible] Chhindwara, Nainital and Jaggaur] for further multiplication.

[illegible] in Gaziabad, [illegible] has procured [illegible] Chs [illegible] for the development of [illegible] trees [illegible] high temperature and [illegible] in the nurture regarded by the Department of [illegible] in Horticulture, University of Pretoria, Pretoria on [illegible].

1 [illegible] contains the knowledge [illegible] Horticulture Training School, Delhi, Delhi. Thanks for [illegible] [illegible] training programmes.

Revenue generated:

Through sale of mature [illegible] : Rs. [illegible]

Through sale of [illegible] : As given in

Total : Rs. [illegible]

4. MULTIVOLTINE SILKWORM

Completed Research Projects:

MS [illegible] (Pl) : Evaluation of Cauvery Gold (MFC × Cbl) × Nirmal and some [illegible] cocoon productivity and silk quality [incl. [illegible] trial]

Authors: [illegible] Chandrakanth (PI), Kavitha Rani (PC), Rajeshwari Devi, S. Prabhu (PI), Rajib Mandal, M. Ramakrishna, [illegible], Pragyan, and Mohan Rao, Agra and Mumbai

Objectives:

1. To evaluate the field performance of newly developed cocoon breed Cauvery Gold (MFC × Cbl) for productivity and silk quality

Pl seed cocoons of MFC and Cbl were earmarked for the evaluation of new improved cocoon breed (MFC × Cbl) at Institute and Research Centre. The breeders were promoted at stage of black moth and subsequent egg development. A total [illegible] dfls of MFC × Cbl were purchased in [illegible] farmers. The [illegible] dfls were brushed to [illegible] (Pl) with an average of [illegible] kg/dfl. The average cost of the [illegible] was [illegible] kg/100 dfls. The new breed, Cauvery Gold (MFC × Cbl) has gained popularity as the farmers realized higher price by its [illegible] higher realization in value and [illegible] with [illegible].

Table 4.1: ...

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Table 4.2: ...

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Table 4.3: ...

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Table 4.4: ...

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	[illegible]		[illegible]		[illegible]

Table [illegible]: [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Summer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Winter	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Ongoing Research Projects

[illegible]

[illegible]

Objectives

- [illegible]
- [illegible]

[illegible]

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[illegible]	[illegible]
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[illegible]	[illegible]

Table 3.7: Diseases and non-diseases genes screened among the three varieties

#	Disease gene	#	Non-disease gene
A	[illegible]	A	Actin
B	[illegible]	B	Ubiquitin
C	[illegible]	C	Tubulin
D	[illegible]		
E	[illegible]		
F	[illegible]		

Fig 3.1: [illegible]

[illegible]

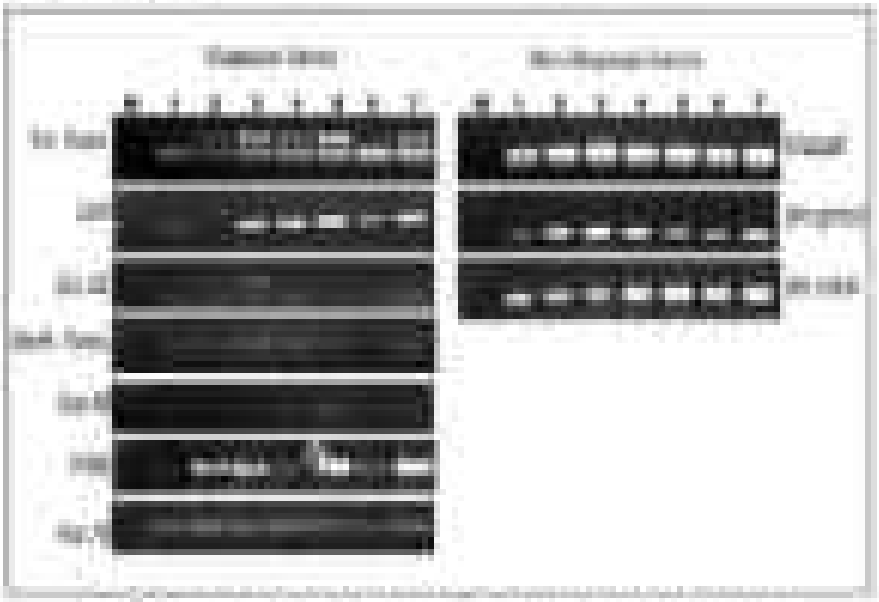

Fig 3.2: [illegible]

Table 3.5. [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
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Table 3.6. [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
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[illegible] the comparative results of expression of duplicate and non-duplicated genes and the phenotypic characters observed, only elite cane varieties were maintained for further study. Based on the genotypic and phenotypic characters, a total seven short listed elite varieties are being maintained for further evaluation and [illegible]. The statistical tools were then used for correlation analysis with all (mentioned), [illegible] and [illegible] characters recorded. The results of testing performance and relevant characters are discussed [illegible].

[illegible]

[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
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21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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- ...
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...

[illegible]

Ongoing research projects

[illegible]: [illegible]

[illegible]: [illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Dry matter	[illegible]	[illegible]
[illegible]		
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Objective: [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Effective weeding was conducted by supplying organic mulberry leaf to silkworm and cocoon using any best combination and international organic assessment was conducted by Indian model and law.

Table 12.1: Analysis of inquiry among customers in season wise

[illegible]	[illegible]		recommended levels for local environmental standards (ppm) [illegible]
	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Technology/Other activities

Maintenance of Cardiospermum

[illegible]

Maintenance of [illegible] of Cardiospermum were done for [illegible] (PCR) and free of silkworm pupae provide healthy eggs results by providing optimal growth conditions

[illegible] analysis revealed that biologically active substances such as [illegible] and [illegible] levels were found to be higher in Cardiospermum feeding and [illegible] silkworm pupae than mulberry [illegible] and [illegible]

II. TECHNOLOGY VALIDATION AND DEMONSTRATION (2018)

Project 2

Location/Other activities

[illegible] evaluation and multiplication of MH-1 (2) under the project

AIM (2021) : Evaluation of Hybrid Cloth (MH-1 x 2) in [illegible] zone based for [illegible] productivity and silk quality [illegible] to Nov (2021)

Under this large scale in house evaluation and multiplication programme, [illegible] of MH-1 (2) and 100 dfls of 64 breeds/cocoon layers and germplasm [illegible] (2 [illegible] total of [illegible]. The rearing performance was evaluated and the data revealed that they are in combination for the original breed characteristics.

[illegible] 12.1: Rearing performance of different [illegible] during [illegible]

Breed	No. of dfls	Size	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			No.	[illegible] (%)	No.	[illegible] (%)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Table 2.1.2: ... during 2020-21

Week	...	Locations		Total Rainfall (mm)
		...	...	
1st week	...	...	...	...
		...	...	

* ... ; ... ; ...

Evaluation of new productive brinjal hybrid entries in trial (NPT)

... the present investigation, evaluation of new productive brinjal hybrid as Network trial (local) is ... were conducted during month of July (Kharif) 2020 and February 2021.

Table 2.1.3: ... performance of productive brinjal hybrids (...)

Hybrid	No. of fruit/plant	Plant height (cm)	Yield/ plant		Yield/ hectare		Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Fruit colour	Yield/ hectare (q/ha)
			(kg)	(q/ha)	(kg)	(q/ha)					
...	...	...	...	...	...	...	...	...	...	...	...

[illegible]

[illegible]

[illegible]

[illegible]

Objectives

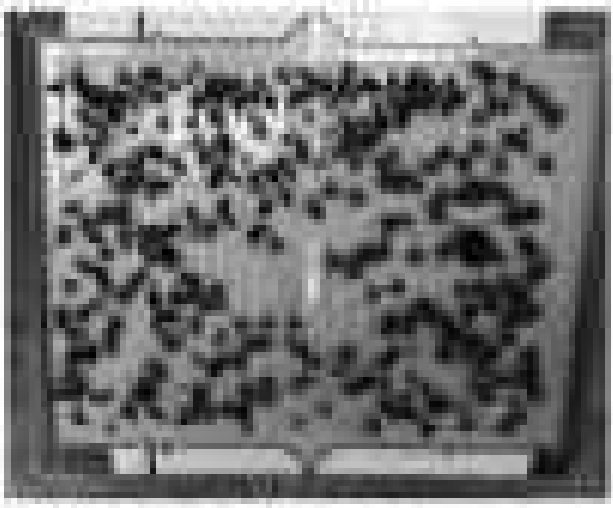
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]



[illegible]

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[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

- [illegible]

[illegible]

- [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Total			[illegible]

[illegible] SILKWORM PATHOLOGY

[illegible]

[illegible]

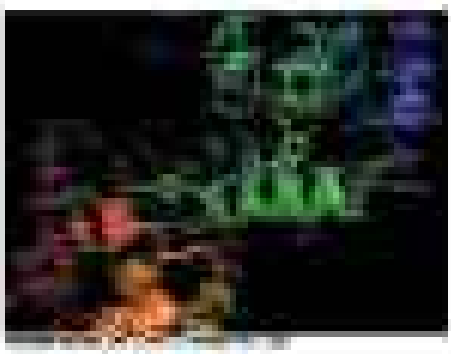
[illegible]

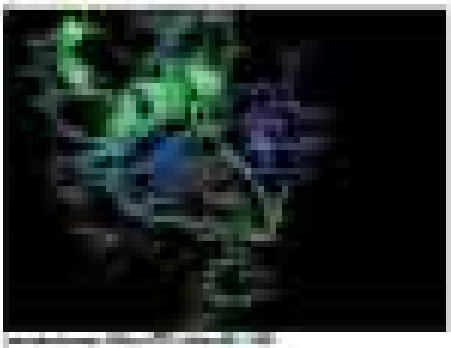
Objectives

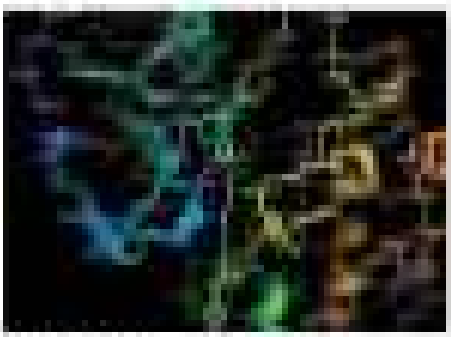
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible] [illegible] [illegible] [







[illegible]

[illegible]

[illegible]

Continuing/Other activities:

Efficient Disease Monitoring in South Indian States

Objectives:

- To estimate the prevalence of different diseases as collected data (new cases and Lymphocyte Count) received ICTC Centers in the South Indian states.
- To suggest remedial measures on the spot to the forest farmers to manage the different diseases and to prevent disease outbreak.

[illegible] was conducted in [illegible] and [illegible] during [illegible] with exception that the coverage disease monitoring was [illegible] for pregnancy, Malaria and Hepatitis B respectively, in comparison to existing practice of collecting blood samples from [illegible] Malaria incidence [illegible] and Hepatitis B incidence [illegible]. The pregnancy incidence in [illegible] was [illegible] and [illegible] respectively. Malaria incidence was [illegible] and [illegible] in [illegible] and [illegible] respectively. The Hepatitis B incidence was reported only from [illegible]. In Tamil Nadu state collected from [illegible] [illegible] from [illegible] pregnancy, [illegible] Malaria and [illegible] Hepatitis B respectively.

The programme validation of the developed technology is ongoing and [illegible] [illegible] [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

34. POST COCOON EVALUATION

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]
4	[illegible]	[illegible]
5	[illegible]	[illegible]
6	[illegible]	[illegible]
7	[illegible]	[illegible]
8	[illegible]	[illegible]
9	[illegible]	[illegible]
	Total	[illegible]

12. AGRICULTURE ENGINEERING

Ongoing research projects

[illegible] Development of artificial intelligence environment multisensory approach for species classification and separation of silkworm cocoons(Jan. 2021 - Dec. 2021)[In Collaboration with TNAU, Madurai]

Working experience in [illegible] (Feb 2019 to Oct 2019, Chennai)

Objectives

- To develop an automatic tool for species identification in young stages
- To develop an automatic tool for non-destructive gender identification in mature stages

Recently, AI has entered in every field and it is currently the most trending topic in the world. As a result, different types of AI techniques are developed for various purposes. Deep learning is one of the AI techniques which has the ability to learn from the data and make decisions. Deep learning algorithms are widely used in the field of [illegible] and [illegible] with [illegible] accuracy.

CEC(CSR)-01- Development of an Apparatus to estimate the resistivity of cocoons (Jul. 2020 – Dec. 2020) [In Collaboration with CSTRI, Kalahasthi]

Designed & Built a Prototype Electrical Resistivity Measuring Machine for Silkworm Cocoons

Experimental Setup

Objectives

- Survey the necessary data for the system development and analysis of cocoon resistivity using various conditions
- Study the cocoon electrical nature for Electrochemical Impedance Spectroscopy (EIS)
- Development of an apparatus to estimate the resistivity of the silkworm cocoons
- Development of an sample preparation unit
- Validation & optimization of apparatus unit by various results

CEC (Design) - Design and development of an apparatus to estimate the resistivity of cocoons in silkworm cocoons, validation of the equipment for cocoons at CSTRI, Kalahasthi

Mini Studies

Design, development and fabrication of horizontal cocoon harvesting machine for plastic collapsible mountages (Nov. 2020 – Mar. 2021, Govt. Sc. Co. Ltd., [illegible] Approval No. [illegible] Grant No. [illegible])

Professional Membership: [illegible]

Objectives

- Development of harvesting machine suitable for matured silk worm cocoons
- Safe and simultaneous defleshing operation for cutting of silk worm cocoons

Under this group mentioned three models viz.,

1) Hardening Harvesting without defoliating (for making of seasons)
2) Hardening Harvesting with one way system of defoliating
3) Hardening Harvesting with three way system of defoliating

Fig. 12.2.1 Conventional manual Harvester Hardening Harvester model without defoliating

Fig. 12.2.2 Harvesting with three way system of defoliating mechanism for cotton crop and seasons

Fig. 12.2.3 Harvesting with one way system of defoliating for hardened and non-ripening seasons

The machine developed mainly consists of a frame, [illegible] and [illegible]. Fixed on the frame are two plastic containers (barrels) one for the solution and another for the spinning process. The solution and the spinning process are connected with a pipe. The spinning basket is connected with a motor by a belt and pulley drive. A switch is provided to control the speed of the motor. The approximate cost of the machine is [illegible]. The cost of the equipment is estimated to be [illegible].

Design & development of a dry fruit operated portable defruiting machine suitable for [illegible] use

[illegible]

Objectives

- Design & Development of different type of manual/hand operated coconut defruiting machine that can easily and smooth operate for the laboratory use/small quantity [illegible] and making it more user friendly machine using less machine elements with energy efficiency

Less difficult to operate of machine are developed. One is with rod spokes and another with cylinder spokes with energy efficiency. The two machines developed under this study are quite handy and can be fitted on any table or trolley. Hand operating machine is convenient in the operation of operator. The cost of the equipment is estimated to be [illegible].

Fig. 10.1: Defruiting machine with one rods mounted on trolley with wheels

Fig. 10.2: Defruiting machine with cylinder and energy pipes mounted on trolley with wheels

Limitations/Scope/ Activities

- Chemical support to the farmers was provided as and when required in the field of extraction/ modification
- The equipments / one man loading machine and one locating machine cause [illegible] were manufactured and installed

CAPACITY BUILDING AND TRAINING

#	Particulars	Target		Achievement	
		Physical (Nos.)	Beneficiaries (Nos.)	Physical (Nos.)	Beneficiaries (Nos.)
1	[illegible]				
1.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]

#	Name of training	Area of Training	Date		No. of Trainees
			From	To	
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	Name of Training	Area of training	Date		No of Trainees
			[illegible]	[illegible]	
1	[illegible]	[illegible]	[illegible]	[illegible]	1
2	[illegible]	[illegible]	[illegible]	[illegible]	1
3	[illegible]	[illegible]	[illegible]	[illegible]	25
4	[illegible]	[illegible]	[illegible]	[illegible]	15
5	[illegible]	[illegible]	[illegible]	[illegible]	1
6	[illegible]	[illegible]	[illegible]	[illegible]	15
7	[illegible]	[illegible]	[illegible]	[illegible]	1
8	[illegible]	[illegible]	[illegible]	[illegible]	4
9	[illegible]	[illegible]	[illegible]	[illegible]	25
10	[illegible]	[illegible]	[illegible]	[illegible]	15
11	[illegible]	[illegible]	[illegible]	[illegible]	1
12	[illegible]	[illegible]	[illegible]	[illegible]	15
13	[illegible]	[illegible]	[illegible]	[illegible]	1
14	[illegible]	[illegible]	[illegible]	[illegible]	1
15	[illegible]	[illegible]	[illegible]	[illegible]	15
16	[illegible]	[illegible]	[illegible]	[illegible]	1
17	[illegible]	[illegible]	[illegible]	[illegible]	1
18	[illegible]	[illegible]	[illegible]	[illegible]	1
19	[illegible]	[illegible]	[illegible]	[illegible]	25
20	Student Project	[illegible]	[illegible]	[illegible]	15
		Total			153

[illegible]

Table [illegible]: [illegible]

[illegible]	[illegible]	[illegible]				[illegible]			
		[illegible]		[illegible]		[illegible]		[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Sl.	[illegible]	[illegible]				[illegible]			
		[illegible]		[illegible]		[illegible]		[illegible]	
		Physical (Nos.)	Financial	Physical (Nos.)	Financial	Physical (Nos.)	Financial	Physical (Nos.)	Financial
[illegible]	[illegible]	[illegible]	[illegible]	-		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]: State-wise details of [illegible]

Sl.	State	[illegible]	[illegible]
1	Tamil Nadu	[illegible]	[illegible]
2	Karnataka	[illegible]	[illegible]
3	Telangana	[illegible]	[illegible]
4	Andhra Pradesh	[illegible]	[illegible]
5	Maharashtra	[illegible]	[illegible]
6	Madhya Pradesh	[illegible]	[illegible]
7	Uttar Pradesh	[illegible]	[illegible]
8	Kerala	[illegible]	[illegible]
	Total	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table [illegible]

Month	[illegible] distributed	No. of farmers	[illegible]
[illegible]	[illegible]	[illegible]	-
May	[illegible]	[illegible]	[illegible]
Jun.	[illegible]	[illegible]	[illegible]
Jul.	[illegible]	[illegible]	[illegible]
Aug.	[illegible]	[illegible]	[illegible]
Sep.	[illegible]	[illegible]	[illegible]
Oct.	[illegible]	[illegible]	[illegible]
Nov.	[illegible]	[illegible]	[illegible]
Dec.	[illegible]	[illegible]	[illegible]
Jan. [illegible]	[illegible]	[illegible]	[illegible]
Feb.	[illegible]	[illegible]	[illegible]
Mar.	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]

Feedback evaluation

Feedback evaluation was carried out for four training programmes after completion of the training through a questionnaire. The results were the figure of the same is presented below:

Table 4.6.1: Feedback Analysis (2021-22)

Course	Training quality index	Training effectiveness index	Training usefulness index	Trainer knowledge index	Training usage index	Overall
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The most training courses in the training program [illegible] ranged from [illegible] to [illegible] agrees and completed following up to [illegible] about the [illegible]. The above a very positive opinion of the trainees about the program. The overall opinion by the trainees regarding the faculty, their knowledge, [illegible] study tour, [illegible] & presentation and effort of faculty are [illegible] were appreciated.

Following Government Orders:

By the [illegible], Women member from [illegible], Karnataka, [illegible], "Kisan Mela" [illegible] the natural harvest of [illegible] and trade in agriculture areas to the technocrats staff of [illegible]. Various [illegible] technology activities and [illegible] programmes demonstrated. Smart farming [illegible] and technology for the precise irrigation management, disease management, pest management, [illegible] weather climate, weather forecast and many others focused, which is being widely used in horticulture areas in the technocrats staff of [illegible] [illegible].

Table 4.6.2 Diverse Opportunities Provided during [illegible]

Sr.	Name of [illegible] Plants	Title	Name of Faculty & Institute	Name of Place & [illegible]
1.	[illegible] [illegible]	Training on [illegible] can be [illegible] [illegible]	[illegible] [illegible]	[illegible]
2.	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]
3.	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]
4.	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]
5.	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]
6.	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]

#	Name of Student Name	Title	University Institution and Submitted	Name of Guide & Institute
1	[illegible] M.E.	[illegible]	[illegible]	[illegible]
2	[illegible] M.E.	[illegible]	[illegible]	[illegible]
3	[illegible] M.E.	[illegible]	[illegible]	[illegible]
4	[illegible] M.E.	[illegible]	[illegible]	[illegible]
5	[illegible] M.E.	[illegible]	[illegible]	[illegible]
6	[illegible] M.E.	[illegible]	[illegible]	[illegible]
7	[illegible] M.E.	[illegible]	[illegible]	[illegible]
8	[illegible] M.E.	[illegible]	[illegible]	[illegible]
9	[illegible] M.E.	[illegible]	[illegible]	[illegible]
10	[illegible] M.E.	[illegible]	[illegible]	[illegible]
11	[illegible] M.E.	[illegible]	[illegible]	[illegible]
12	[illegible] M.E.	[illegible]	[illegible]	[illegible]

#	Name of Student Degree	Title	University Institution in which Submitted	Name of Guide & Co-Guide
01	[illegible] M.Sc.	Evaluation of Botanical Screening Methods on [illegible]	Department of Biotechnology, [illegible] Higher Education and Research, Mhasvad	Dr. [illegible] and [illegible]
02	Bhagat [illegible] M.Sc.	Screening for phytochemicals and to evaluate the antibacterial activities [illegible]	Department of Microbiology, [illegible] Higher Education and Research, Mhasvad	Dr. [illegible] and [illegible]
03	Gaikwad [illegible] M.Sc. (Re Chemistry)	Synthesis and characterization [illegible]	Autonomous College of the University of Mhasvad	Dr. [illegible] Mr. [illegible]
04	Kamble [illegible] M.Sc. (Re Chemistry)	Synthesis and characterization [illegible]	Autonomous College of the University of Mhasvad	Dr. [illegible] Mr. [illegible]
05	[illegible] M.Sc. (Re Chemistry)	Synthesis and characterization [illegible]	Autonomous College of the University of Mhasvad	Dr. [illegible] Mr. [illegible]
06	[illegible] M.Sc., Chemistry	Carbon quantum dots [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
07	[illegible] M.Sc., Chemistry	Carbon Nanotube [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
08	[illegible] M.Sc., Chemistry	Synthesis and [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
09	[illegible] M.Sc. Chemistry	Chemical [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
10	[illegible] M.Sc. Chemistry	Chemical [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
11	[illegible] M.Sc. Chemistry	Chemical [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
12	[illegible] M.Sc. Chemistry	Chemical [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
13	[illegible] M.Sc. Chemistry	Chemical [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
14	[illegible] M.Sc. Chemistry	Evaluation of [illegible]	[illegible] Science & Technology University, Mhasvad	Dr. [illegible] [illegible]
15	[illegible] M.Sc.	Technique for [illegible]	Department of Biochemistry, [illegible] Higher Education and Research, Mhasvad	Dr. [illegible] and [illegible]

[illegible]	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]
[illegible]	[illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]

Particulars	Amount (Rs.)
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Total	[illegible]

17. SERICULTURAL EXTENSION, ECONOMICS AND MANAGEMENT

[illegible]

On-going research project

[illegible]

[illegible]

Objectives

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

Andhra Pradesh	Madhya Pradesh	Tamil Nadu
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]		

Cluster Promotion Programme (CPP)

[illegible] Central Silk Board in collaboration with the Department of Sericulture (DoS) of [illegible] [illegible] Table [illegible]

Table [illegible]

Cluster	CSB	DoS
	[illegible]	
1. [illegible]		
1. [illegible]	[illegible]	[illegible]
2. [illegible]	[illegible]	[illegible]
3. [illegible]	[illegible]	[illegible]
2. [illegible]		
1. [illegible]	[illegible]	[illegible]
2. [illegible]	[illegible]	[illegible]
3. [illegible]	[illegible]	[illegible]
3. [illegible]		
1. [illegible]	[illegible]	[illegible]
2. [illegible]	[illegible]	[illegible]
4. [illegible]		
1. [illegible]	[illegible]	[illegible]
2. [illegible]	[illegible]	[illegible]
5. [illegible]		
1. [illegible]	[illegible]	[illegible]
2. [illegible]		[illegible]
3. [illegible]		[illegible]
	[illegible]	
1. [illegible]		
[illegible]	[illegible]	[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
2. [illegible]		
[illegible]		[illegible]
[illegible]	[illegible]	[illegible]
[illegible]		[illegible]

A. Genealogy (GE)		
Chatham	Ambassador, Duke of Northbridge	1. Nicholas, 4th Chatham
Hyde		Blackridge, 12th Duke
Pitt		1. Lucy, 4th Pitt of Kingsbridge
Selby		Blackridge, 12th Duke
B. Naval (nvl)		
Blackridge	12th Duke, Admiral of the Blue (Gibraltar)	12. Blackridge, 12th Duke
Hazel	1. Captain, R.N., HMS Dreadnought	1. J. Hill, R.N., Hazel
Templemore	3. Admiral, RN, HMS Victorious	Rear-Adm. Templemore
C. Aristocratic (ARI)		
Chatham	4. Lord Chatham, 3rd Earl of Chatham	4. Nicholas, 4th Chatham
Duke	12. Duke of Blackridge, 8th Earl of Selby	12. Duke, 12th Duke
Lansdowne	1. Marquess of Lansdowne, 4th Viscount Templemore	1. Lansdowne, 4th Lansdowne
D. Arts (ART)		
Hazelwood	Lady Hazelwood, Duchess of Blackridge, Countess of Selby (Viscount Templemore)	Lady Hazelwood, Duchess of Blackridge
Blackridge		Hazelwood, 12th Duke, Blackridge
Schubert		Schubert, 12th Duke, Blackridge
Tate		Tate, 12th Duke, Blackridge
Wilde		Wilde, 12th Duke, Blackridge
E. Naval (nvl)		
Langdale	Lieutenant-Colonel Langdale	Lt. Langdale, 12th Duke, Langdale
Hudson	Lt. Hudson, R.N., HMS Hyperion	Lt. Hudson, R.N., Hudson
Wilcox	Lieutenant, R.N., HMS Victory	Lt. Wilcox, R.N., Wilcox
F. Hotels (HOT)		
Bailey	Duke of Blackridge, 8th Earl of Selby	Duke, 12th Duke, Blackridge
Hazelton		Hazelton, 12th Duke, Blackridge
Chatham		Chatham, 12th Duke, Blackridge
Langdale		Langdale, 12th Duke, Blackridge
Templemore		Templemore, 12th Duke, Blackridge
G. Hotels (HOT)		
Hazelwood	Lady Hazelwood, Duchess of Blackridge, Countess of Selby (Viscount Templemore)	Lady Hazelwood, Duchess of Blackridge
Hyde		Hyde, 12th Duke, Blackridge
Pitt		Pitt, 12th Duke, Blackridge
Selby		Selby, 12th Duke, Blackridge
H. Genealogy (GE)		
Templemore	Viscount Templemore, 3rd Earl of Selby	Templemore, 12th Duke, Blackridge
Lansdowne		Lansdowne, 12th Duke, Blackridge
Hazelwood		Hazelwood, 12th Duke, Blackridge
Selby		Selby, 12th Duke, Blackridge
I. Tudor (TUD)		
Tate	1. Tudor, Viscount Templemore, 3rd Earl of Selby	Tate, 12th Duke, Blackridge
Tudor		Tudor, 12th Duke, Blackridge
Pitt		Pitt, 12th Duke, Blackridge

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x. xxxxxxxx (xxx)		
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xxxx		xxx x x x, xxx x x x
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x. xxxxxxxx (xxx)		
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x. xxxxxxxx (xxx)		
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x. xxxxxxx (xxx)		
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xxxxxxx		x x xxxxxx, xxx, x xxx
x. xxxxxxx (xxx)		
xxxxxxx	x xxxxxxxxxx, xx x x, xxx x xxx	x x xxxxxx, xxx, x xxx
xxxxxxxxx	

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]		
[illegible]	[illegible]	[illegible]
[illegible]		
[illegible]	[illegible]	[illegible]

[illegible]

Performance of Zambia

During the year under review Zambia recorded a production of [illegible] MT to deliver [illegible] MT, which is [illegible] of an annual [illegible] MT.

Table [illegible]: Zambia's production in south west [illegible]

Year	Target (MT)	Production (MT)	Achievement (%)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]: Zambia's [illegible] production (MT)

[illegible]	[illegible]	[illegible] (MT)	[illegible] (%)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Crop Performance

A total of [illegible] hybrid [illegible] were distributed in the Province in the south west against the target of [illegible] hybrid [illegible] representing [illegible]. A total of [illegible] MT [illegible] were produced in the [illegible] [illegible] MT [illegible] [illegible]

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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[illegible]

Table [illegible]

[illegible]	[illegible]	
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Grand Total	[illegible]	[illegible]

[illegible] Meeting

[illegible]

[illegible]

[illegible]

Continuing/Other Activities

Extension Communication Programmes (ECP)

During [illegible], a total of [illegible] Extension Communication Programmes were conducted and benefited [illegible]

Table [illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Farmers Field day	[illegible]	[illegible]
Awareness programme	[illegible]	[illegible]
Technology demonstration/ [illegible] programme	[illegible]	[illegible]
Workshop/ Seminar & Conferences	[illegible]	[illegible]
Total	[illegible]	[illegible]

Backward Orientation

[illegible] [illegible] [illegible] [

[illegible]

An awareness programme under Agricultural extension was organized by [illegible] village under S.C.Tribal Studies on [illegible] for the benefit of Sericulture farmers and members. The main aim of the programme was to make the farmers aware [illegible] and technology there.

Publication of Sericulture Success Stories Vol. 3

A book titled Sericulture Success stories Vol. 3 was published by interviewing 06 success stories of sericulture from Andhra Pradesh, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Rajasthan, Tamil Nadu and Telangana. The book was released by Dr. Upadhyaya, Director, Central Sericultural Germplasm Resources Centre, Hosur and Dr. Rekha Tewari, Director (CSR), Mysuru, on 31st December, 2020 at CSRTI, Mysuru.

Visitors' Section

During the year, a total of [illegible] visited the institute including farmers, students, entrepreneurs, [illegible] and officials.

Category	No. of Persons visited
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

18. REGIONAL SERICULTURAL RESEARCH STATION (RSRS) – KODATHI

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

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Table 8.1: Training performance evaluation of teaching institutes at RIEVE Gadakhi

Institute	Affil.	Training Sessions	Annual Learner Reach	Hours Delivered	Mock Interviews Conducted	Placement Rate (%)	Retention Rate (%)	Employer Satisfaction (%)
GITI Gadakhi	Govt	412	9,180	18,540	3,210	71.4	82.6	4.1
GITI Ramnagar	Govt	356	7,940	16,020	2,870	68.9	80.1	4.0
ITI Kalyanpur	Govt	298	6,610	13,410	2,390	66.2	78.4	3.9
ITI Sonbarsa	Govt	241	5,320	10,860	1,940	63.7	76.9	3.8
ITI Mahuadih	Govt	187	4,150	8,470	1,510	61.0	75.2	3.7
ITI Lakhanpur	Govt	164	3,640	7,420	1,330	59.8	74.1	3.6
ITI Bhatauli	Govt	142	3,120	6,380	1,140	58.4	73.0	3.6
ITI Chandanpur	Govt	118	2,610	5,340	950	57.1	72.3	3.5
ITI Rampur Khas	Govt	96	2,140	4,380	780	55.9	71.5	3.5
ITI Tilakpur	Govt	74	1,650	3,380	600	54.6	70.8	3.4
ITI Sahebganj	Govt	58	1,290	2,640	470	53.2	70.1	3.4
ITI Mohanpur	Govt	41	910	1,860	330	52.0	69.4	3.3
ITI Kusumdih	Govt	29	640	1,310	230	50.7	68.7	3.3
ITI Jagdishpur	Govt	18	400	820	140	49.5	68.0	3.2
ITI Nandgaon	Govt	9	200	410	70	48.3	67.3	3.2
ITI Pipraon	Govt	4	90	180	30	47.0	66.6	3.1
ITI Harsidh	Govt	2	40	80	10	45.8	65.9	3.1

Table 8.2: Evaluation of parent and emergency contact information on file for trainees at each institute

Institute	Code	Trainees Enrolled	Parent Contact Recorded (%)	Emergency Contact Recorded (%)	Both Contacts Verified (%)	Guardian Consent Forms Signed (%)	Photo ID Collected (%)	Overall Compliance (%)
Aarohi Academy	AA	1,240	98.4	97.1	95.6	99.2	96.8	97.4
Bright Future Institute	BFI	860	91.2	88.7	84.3	93.5	90.1	89.6
Crescent Coaching	CC	2,310	96.8	95.9	93.1	97.4	95.2	95.7
Delta Skills Hub	DSH	540	88.5	86.2	81.0	90.7	87.4	86.8
Eagle Eye Academy	EEA	1,075	94.1	92.6	89.8	95.3	93.0	92.9
Future Leaders Institute	FLI	1,980	97.3	96.4	94.7	98.1	96.0	96.5
Global Edge Training	GET	730	85.6	83.9	78.2	88.4	84.7	84.2
Horizon Vocational	HV	1,420	93.7	91.8	88.5	94.6	92.3	92.2
Indira Gandhi Skill Centre	IGSC	2,650	99.1	98.3	97.0	99.5	98.2	98.4
Jagriti Education Centre	JEC	615	90.0	87.5	83.1	91.8	89.2	88.3
Kalpana Chawla Institute	KCI	1,760	95.4	94.0	91.2	96.7	94.5	94.4
Lotus Valley Academy	LVA	980	92.8	91.1	87.6	94.0	91.7	91.4
Mahatma Phule Institute	MPI	1,340	96.0	94.7	92.4	97.1	95.0	95.0
Navjeevan Training Hub	NTH	2,080	97.9	96.8	95.3	98.4	96.9	97.1
Omkar Skill Academy	OSA	1,205	94.6	93.2	90.5	95.8	93.7	93.6
Pragati Vocational	PV	1,890	96.5	95.1	93.0	97.2	95.6	95.5
Quest Learning Centre	QLC	470	82.3	80.6	74.9	86.1	82.0	81.2
Rajiv Gandhi Institute	RGI	2,540	98.7	97.9	96.8	99.0	97.8	98.0
Sahyog Training Centre	STC	1,150	93.4	92.0	89.1	95.0	92.6	92.4
Tagore Academy	TA	1,610	95.9	94.5	92.1	96.9	94.8	94.8
Udaan Skill Hub	USH	1,330	94.2	92.7	90.0	95.5	93.4	93.2
Vidya Sagar Institute	VSI	2,210	97.6	96.5	94.9	98.2	96.7	96.8
Yashoda Training Centre	YTC	760	89.1	87.4	82.6	91.3	88.5	87.8
Zenith Coaching	ZC	1,495	95.2	93.8	91.4	96.4	94.3	94.2
Ambedkar Nagar Centre	ANC	1,870	96.9	95.7	93.8	97.6	95.9	96.0
Bharat Skill Mission	BSM	2,940	98.2	97.4	96.1	98.8	97.5	97.8
Chhatrapati Shivaji Institute	CSI	1,705	95.7	94.3	92.0	96.8	94.6	94.7
Deendayal Upadhyaya Centre	DUC	2,360	97.8	96.9	95.4	98.5	97.2	97.2
Ekalavya Training Hub	ETH	1,045	93.0	91.5	88.7	94.7	92.2	92.0
Fatima Sheikh Academy	FSA	1,290	94.8	93.4	91.0	96.0	93.9	93.8
Gandhi Ashram Institute	GAI	1,580	96.3	95.0	92.7	97.0	95.1	95.2
Harishchandra Vocational	HCV	1,120	93.6	92.1	89.3	95.1	92.8	92.6
Indira Nagar Skill Centre	INSC	1,965	96.7	95.4	93.5	97.4	95.5	95.7
Jyotiba Phule Academy	JPA	1,430	95.1	93.7	91.3	96.2	94.0	94.1
Kasturba Gandhi Centre	KGC	1,760	96.0	94.8	92.5	96.9	94.7	95.0
Lokmanya Tilak Institute	LTI	2,080	97.1	96.0	94.2	98.0	96.3	96.3
Maharishi Valmiki Centre	MVC	1,340	94.5	93.1	90.8	95.7	93.6	93.5
Netaji Subhas Academy	NSA	1,905	96.6	95.3	93.2	97.3	95.4	95.6
Om Prakash Training Hub	OPTH	1,215	94.0	92.6	90.1	95.4	93.2	93.1
Pandit Deendayal Institute	PDI	1,670	96.2	94.9	92.8	97.1	95.0	95.2
Rani Lakshmibai Centre	RLC	1,540	95.8	94.5	92.2	96.8	94.7	94.8
Savitribai Phule Academy	SPA	1,810	96.4	95.2	93.0	97.2	95.1	95.4
Tilak Maharashtra Institute	TMI	1,260	94.7	93.3	91.0	95.9	93.8	93.7
Vivekananda Skill Centre	VSC	1,985	96.8	95.6	93.7	97.5	95.6	95.8
Yashwantrao Chavan Institute	YCI	1,395	95.3	94.0	91.7	96.5	94.4	94.4
Zakir Hussain Academy	ZHA	1,720	96.1	94.8	92.6	97.0	94.9	95.1

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22. REGIONAL SERICULTURAL RESEARCH STATION (RSRS) - CHAMARAJANAGAR

In-charge Officer	[illegible]	
Scientists	[illegible]	
Technical Staff	[illegible]	
Administrative staff	[illegible]	
Others	[illegible]	
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

On Station Trials (OST)

Evaluation of different breeds and hybrids

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Continuous/Other activities

Extension Communication Programme

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]

1. [illegible]	[illegible]	[illegible]	[illegible]
2. [illegible]	[illegible]	[illegible]	[illegible]
3. [illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
1. [illegible]	[illegible]	[illegible]	[illegible]
2. [illegible]	[illegible]	[illegible]	[illegible]
Total		[illegible]	[illegible]

Table [illegible]: [illegible] training programmes

Date	Place	No. of farmers	Exp. (Rs)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Total		[illegible]	[illegible]

Table [illegible]: [illegible]

Month	Hybrid	Qty	Rate/100 (Rs)	Amount (Rs)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]

Table [illegible]: [illegible]

Particulars	Amount (Rs)
1. [illegible]	[illegible]
2. [illegible]	[illegible]
3. [illegible]	[illegible]
4. [illegible]	[illegible]
Total	[illegible]

[illegible]

[illegible]

20. REGIONAL SERICULTURAL RESEARCH STATION (RSRS) - SALEM

Incharge Officer	[illegible]
Scientists	[illegible]
Technical Staff	11
Administrative & Supporting Staff	11

Units	Total area	Mulberry acreage
RSRS Salem	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	–	-
[illegible]	–	-
[illegible]*	-	-
Total	[illegible]	[illegible]

*Closed on [illegible]

Ongoing Research projects

[illegible]: Effect of Potassium Solubilizing Bacteria [illegible] on growth and development of mulberry ([illegible] 2020 to [illegible] 2022)

Objectives

- To study the influence of potassium mobilizing bacteria with graded levels of potassium on growth and leaf yield of mulberry.
- Reduce the cost of cultivation by curtailing the chemical fertilizer application.
- Conserving the soil sustainability by applying eco-friendly biological agents.

[illegible] Completed the first crop harvest and the garden is pruned and imposed the treatments as per the experimental plan for second crop.

Programmes/Other Activities

Silkworm Disease survey

Silkworm disease survey was conducted under the program [illegible] Silkworm Disease monitoring [illegible] [illegible] survey data from [illegible] farmers [illegible] was collected and uploaded in the [illegible].

On-station trials

Testing of newly developed bivoltine hybrids at RSRS Salem

Table 20.1: [illegible] (Season: Aug – Dec 2020)

Hybrid	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]

Hybrid	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]

Hybrid	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]

Hybrid	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

Table [illegible]

Hybrid	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]				
Treatment	[illegible]	[illegible]	[illegible]	No disease
Control	[illegible]	[illegible]	[illegible]	No disease
[illegible]				
Treatment	[illegible]	[illegible]	[illegible]	No disease
Control	[illegible]	[illegible]	[illegible]	No disease

[illegible]

Particulars	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
First Trial							
Treatment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Control	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Second Trial							
Treatment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Control	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Third Trial							
Treatment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Control	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Name of the Farmer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total/Avg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	–	–	
[illegible]	[illegible]	[illegible]	–	–	[illegible]
[illegible]	[illegible]	[illegible]	–	–	–
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	–	[illegible]	–		[illegible]	[illegible]	–
[illegible]	[illegible]						[illegible]	[illegible]
[illegible]	[illegible]						[illegible]	[illegible]
[illegible]			[illegible]			[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	–		[illegible]	[illegible]	–
[illegible]	[illegible]							

[illegible]

[illegible] Report (CFP)

A total of [illegible] lakh ells of [illegible] harvest were marketed in [illegible] Vembanad Kattumangalam cluster and [illegible] an average catch of [illegible] kg/ha/day (8) with notable improvement in productivity against the [illegible] mark.

Table [illegible] Livelihood Village Contact Programme in Vembanad-Kattumangalam cluster of Kerala

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Capacity building of farmers including integrations

Table [illegible] Capacity building activities and farmers training programmes

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Mass multiplication and distribution of Bio-control Agents

Name of the Bio-control agents	Units supplied	No. of Farmers
[illegible]	[illegible]	[illegible]

Agro-climatic Resources Centers (ARC)

[illegible] Agro-climatic Resources Centers, under [illegible] Kattumangalam [illegible] and [illegible] Mangalvanam Bird Sanctuary [illegible] demonstration, conducted [illegible] training [illegible] and [illegible] farmers and [illegible] farmers were trained on [illegible] and [illegible] training.

Name of the [illegible]	Name of the [illegible]	No. [illegible]	No. of [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Surveys and surveillance for [illegible] in [illegible] Kattumangalam area

[illegible] survey was conducted for monitoring [illegible] of [illegible] and [illegible] [illegible] measures were [illegible] suggested for prevention and control.

[illegible]

Month	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	-	-	-	-	-	-	-	-
[illegible]	-	-	-	-	-	-	-	-	-
[illegible]	[illegible]	[illegible]	-	[illegible]	-	-	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	-	[illegible]	-	-	-	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	-	[illegible]	-	-	-	-	[illegible]
[illegible]	[illegible]	[illegible]	-	[illegible]	-	-	[illegible]	-	[illegible]
[illegible]	-	[illegible]	[illegible]	-	-	-	[illegible]	-	-
[illegible]	-	-	[illegible]	[illegible]	-	-	-	-	[illegible]
[illegible]	-	-	[illegible]	-	[illegible]	[illegible]	-	-	[illegible]
[illegible]	-	-	[illegible]	-	[illegible]	[illegible]	-	-	-
[illegible]	-	-	[illegible]	-	[illegible]	[illegible]	-	-	[illegible]
[illegible]	-	-	-	-	-	-	-	-	-
Mean	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

[illegible]

Thesis submitted

[illegible]	[illegible]	[illegible]	Subject of Topic
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

31. REGIONAL AGRICULTURAL RESEARCH STATION (RARS) – ANANTAPUR

[illegible]	[illegible]
Scientists	13
Technical staff	11
Administrative & supporting staff	11

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible] are involved in the following collaborative projects with the main [illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

[illegible]

[illegible] trained 30 students and disseminated the [illegible] technologies to the farmers of [illegible] [illegible] of [illegible] hybrids was used [illegible] with an [illegible] of [illegible] against the target of [illegible] with [illegible] an average farmer yield of [illegible] [illegible]. The new pigeonpea [illegible] was [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible]

The [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]								
[illegible]								
[illegible]								

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Validation of Ghasitu Feed Supplement Formulation (2020)

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Validation of Bhuvanswar award for Tara

The technology was also verified with ISO certification between under DPI Odisha by and Himachal. The [illegible] under the Scientific Education "the Government based on Iraq technology is found effective based on the results obtained.

Education communication programmes (ECPs)

Similarly, Space Applications, Anantapur Programmes, Pune Space Technology and Applications centre were produced by many where about and to ensure activities for transfer of technology to ensuring the video footage and are then aimed.

Table 2.1.10: Television Communication programmes by ISRO undertaken and broadcast via the

Series	Space Application	Television Day	Programme timing / Local day	Regional Activities
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		
Total	[illegible]	[illegible]	[illegible]	[illegible]

Nodium Multimedia 'Nomad' workshop

The Nodium Multimedia was conducted at Nalanda on [illegible]. There were 457 farmers including SAE & JRA officials and operated the programme. Dr. [illegible], Director (I), [illegible], Kalyani, Smt. Lavanya Kumari, Additional Director of Agriculture, Govt. of Andhra Pradesh, Dr. B. Ravindhran, Dr. N. S. Sahadeva, Scientist-SE, were organized over to Middle east, and a number of agriculture, printers were participated.

Training programmes under Farm to Fork Training and Training Services Staff training [Vol 2]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Total	[illegible]

Radio/TV programmes

Interviewing our participation in radio programmes, for the benefit of rural farmers as part of technology transmission.

Telecommunication

S.	[illegible]	[illegible]
1	[illegible]	[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]
	[illegible]	[illegible]

[illegible] REGIONAL HORTICULTURAL RESEARCH STATION (RHRS) - [illegible]

[illegible] Office	[illegible]
Scientists	[illegible]
Technical Staff	[illegible]
Administrative & Supporting Staff	[illegible]

Livelihood/Other activities

Extension Communication Programmes (ECPs) conducted

Name of the event	Annual Target (No. of events)	No. of programs conducted	No. of farmers benefited	Expenditure (Rs.)
Farmers Field Day	[illegible]	[illegible]	[illegible]	[illegible]
Awareness Prog	[illegible]	[illegible]	[illegible]	[illegible]
Technology demonstration / [illegible] programmes	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible] Programme

[illegible]

[illegible]

[illegible]

33. ADMINISTRATIVE REPORT

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]		[illegible]			
[illegible]		[illegible]			
[illegible]		[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]			[illegible]
[illegible]	[illegible]	[illegible]			

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] [illegible] [illegible] [

[illegible] [illegible] [illegible] [

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

24. RESEARCH ADVISORY COMMITTEE

Chairman

[illegible]

Members

[illegible]

Details of Review Meetings at CSRTI Mysore

[illegible] Research Council	[illegible]
[illegible] Research Advisory Committee	[illegible]
[illegible] Research Council	[illegible]

Conference/Webinar/Workshop Attended

[illegible]	Organised by	Date	Venue & Description
[illegible]	Department of Entomology, Entomology and Nematology, M. Sabesa College, Bangalore	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Department of Studies in Agriculture Science, University of Calicut, Kerala	[illegible]	[illegible]
[illegible]	Department of Studies in Agriculture Science, University of Calicut, Kerala	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Department of Entomology, Tamil Nadu Agricultural University, Coimbatore	[illegible]	[illegible]
[illegible]	Department of Entomology, Tamil Nadu Agricultural University, Coimbatore	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Department of Entomology, University of Calicut	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Department of Studies in Agriculture Science, University of Calicut, Kerala	[illegible]	[illegible]

International conference on [illegible] for Sustainable Development	Department of [illegible] and Extension, [illegible] Tripura	[illegible] 2020	[illegible]
[illegible] management [illegible]	[illegible] Association of India [illegible]	[illegible] 2020	[illegible]
Webinar on Integrated Nutrient Management in [illegible]	Department of [illegible] University of [illegible]	[illegible] 2020	[illegible]
Young Scientists conference	India International Science Festival 2020	[illegible] 2020	[illegible]
National webinar on [illegible]	[illegible]	[illegible]	[illegible]
Online workshop on Artificial Intelligence based smart agriculture for Sustainable Development	Centre for Artificial Intelligence, [illegible]	2020-[illegible] 2021	[illegible]

Training Programmes Undergone

Training programme	Organized by	Date	Name & designation
[illegible]	[illegible] Development [illegible]	[illegible] 2020	[illegible]
[illegible]	[illegible], Hyderabad	[illegible]	[illegible]
[illegible]	National Institute of Agricultural [illegible] Management [illegible], Hyderabad	[illegible] 2020	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

One day training programme on disaster management approaches for promotion of the tourism industry	NIDM, Hyderabad	14.03.22 to 15.03.22	Dr. Ramesh J Dr. Ramachandra Rao Dr. Lalith Kumar J Dr. Ravi Dr. Srikanth Dr. Krishnamurthy Mr. Ramanaiah
Skill development entrepreneurship development programme	CSTT, Chennai	14.03.22 to 23.03.22	Mr. Ramesh G
One day training on Hospital safety with special reference to cyclone 2019	CSTT, Hyderabad	28.03.22 to 29.03.22	Dr. Ravi Kumar P Mr. Srikanth

Guest lectures delivered

Programme	Organized by	Date	Name & Designation
Disaster safe water Practices for Students and Faculty	Samskruthi Training Institute Kadapa, Andhra Pradesh	20.11.2021	Dr. Ramesh G
Disaster safe water Practices	Samskruthi Training Institute, S.V. PG, Tirupati	24.11.2021	Dr. Ramesh G
Flood risk management in Andhra Pradesh	IDS Association of India	13.12.2021	Dr. Ramesh G

25. PUBLICATIONS

Books/ Book Chapters

- Adhikari, Suman Kumar, Priyanka Sharma, Anoop Singh (2022) Multidisciplinary Approach for Assessment of Marine Pollutants, In: Environmental Chemistry and Recent Developments (Advances and Challenges) (Editors: Suman Kumar Adhikari, Priyanka Sharma, Rakesh Kumar Singh, Dhruv Singh), Bookrivers Press, United Kingdom, pp. 1-26.
- Adhikari, Suman Kumar, Priyanka Sharma, Rakesh Kumar Singh, Anoop Singh (2022) Unmanned Aerial Vehicle (UAV) based Wastewater System for Assessment of Organic Contaminants: present and future perspectives, In: Wireless Technologies for Sustainable Development (Editors: Ajay Kumar Singh, Rakesh Kumar Singh, Priyanka Singh, Pradeep Kumar Sharma), Bookrivers Publishing, United Kingdom, pp. 91-108.
- Adhikari, Suman Kumar, Priyanka Sharma, Rakesh Kumar Singh, Dhruv Singh (2022) Endocrine Disrupting Compounds: Sources, Fate, Occurrence and Health Impacts, In: Endocrine Disrupting Chemicals: Occurrence, Fate and Health Impacts (Editors: Suman Kumar Adhikari, Priyanka Sharma, Rakesh Kumar Singh, Dhruv Singh), Springer Nature Switzerland AG, Switzerland, pp. 1-30.
- Anoop Singh, Pardeep Kumar Singh, Rajesh Kumar Singh, Shashank Gupta, Sushil Kedia, Ajay Kumar (2022) Plant growth promoting bacteria and their role in environmental management, In: Adaptation of Microorganisms to Extreme Environments and Strategies (Eds) Shashank Gupta, Ajay Kumar, Sunanda Biswas, Springer, pp. 183-213.
- Dhruv Singh, Pardeep Kumar Singh, Vivek Kumar Singh, Tanveer Kumar, Manisha Mishra, Komal Rathore, Alok Kumar (2022) Plant growth promoting bacteria: application in bioremediation of salinity and heavy metal contaminated soils, In: Microbes mediated remediation of environmental contaminants (eds) Vijay Kumar, Rajesh Kumar Singh, Pradeep Singh, Anoop Singh, Ashok Yadav, Woodhead Publishing, United Kingdom, pp. 109-126.

Dhruv Singh, Devkaran Kumar Singh, Vipin Kumar Singh, Anupam Dhruv, Harjeet Verma, Ajay Kumar (2022) Plant growth promoting bacteria as biocontrol agents against diseases of horticultural crops. In *Recent Advances in Plant Disease Management* (pp.). Jaya Kumar and Gaurav Dubey. Arunkamal Publishing, United Kingdom. pp. 111-133.

Hemlal, Pandey (2022) Samacharon Gyaanendriyon ke [...] k.G. Samanya, G. K. Gupta, Lucknow Kumaon evam Gaurav [Link] Universal evolutionary research of meaning methods. *Hyderabad*.

खंड II: पत्रिका

Vide Archival Journals

Amit Sahni, Singh KS, Vinkeshwar Agrawal, Sandeep Sahni (2020) Hybrid spatio-temporal modeling and application to epidemic rainfall forecasting. *Mausam Journal* 71(2):249–260. https://doi.org/10.54302/mausam.v71i2.249

Anandkumar CG, Chandran BS, Hemantkumar MJ, Sabu Gandhi J, Singh T, Balakrishnan I and Pandey Sharma (2021) Survival, morphology, identification and utilization of plant growth promoting rhizobacteria for biocontrol of damping-off disease in Mulberry (*Morus alba*). *PeerJ Preprints* 9:e27213v1. https://doi.org/10.7287/peerj.preprints.27213v1

Bhabha Kumar A and Srivastava Ajay (2020) Healthy status of five staple mulberry cultivars in Kashmir Valley. *Int J Adv Res* 8(08):1-8. https://doi.org/10.21474/IJAR01/11660

Bhagat RM, Sahni A, Kalita MC, Vinkeshwar Agrawal, Manjushree Mahanta, Sandeep Sahni (2008) Molecular phylogeny, identification and pathogenicity of *Rhizoctonia solani* associated with root and rot of mulberry in India. *J Appl Microbiol*. https://doi.org/10.1111/j.1365-2672.2008.03966.x

Bhan Kumar AG, Sudhakar C, Vijaya Lakshmi K and Reddy BA (2014) Cluster Frontline Demonstration (CFD): A critical method for the upliftment of socio-economic conditions of scheduled castes and scheduled tribe farming community. *Innovative Farming*, 1(1):124-126.

Bhan Kumar AG, Vijaya Lakshmi K, Sudhakar C, Vijaya Kumari and Reddy BA (2016) Front line demonstration programme (FLD) - a gaze for Development of pulse production in Kalahasthi, Chittoor district of Andhra Pradesh. *Innovative Farming*, 1(1): 039-043.

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Sequences submitted

Nucleotide sequences (3)

Eight nucleotide sequences of *Rhodopirellula baltica* SH 1 genes involved in nucleotide sugar metabolism, a putative cell envelope-related transcriptional attenuator family protein gene, a putative cell envelope-related transcriptional attenuator family protein gene, and a putative cell envelope-related transcriptional attenuator family protein gene submitted to EMBL/GenBank/DDBJ databases.

Nucleotide sequences of 23 different bacterial cell envelope-related sequences submitted to NCBI GenBank database.

Nucleotide sequences of pathogenic-related bacteria (*Escherichia coli* strain O157:H7 EDL933, *Escherichia coli* strain O157:H7 Sakai, *Escherichia coli* strain CFT073, *Escherichia coli* strain K12, *Escherichia coli* strain O157:H7 EC4115, *Escherichia coli* strain UTI89, *Escherichia coli* strain 536, *Escherichia coli* strain IAI1) submitted to EMBL/GenBank/DDBJ databases.

NCBI gene records

Replication of *E. coli* K12 DNA

Replication of *E. coli* O157:H7 EDL933

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CSRTI-Mysuru Extension/Field Units