EXPERIMENTAL FINDINGS (RESULTS)

RESULTS:

4. Average Leaf yield of per plant (*Quercus serrata*) and per hectare with application of FYM and NPK

The experiment finding of the present investigation on average leaf yield of per plant of *Quercus serrata* and per hectare under three different treatments in Spring and Autumn season in 2013 and 2014.

(A) Control without any input (without application of FYM and NPK)

(B) Application of NPK and FYM.

(C) Application of FYM

4.1. Leaf yield of per plant /per hectare of *Q.serrata.* under different treatments During Spring 2013 and 2014, the average yield per plant of *Quercus serrata* recorded .

Treatment A(Control)-1.15 Kg per plant and 7752.00 Kg per hectare when not applied any input.

Treatment B – 1.53 Kg per plant and 10355.00 Kg per hectare when applied 48.0 gm Urea, 46.5gm SSP and 9.3 gm MOP and 10Kg FYM per plant.

Treatment C- 1.320 Kg per plant and 8875.00 Kg per hectare when applied 10Kg FYM only.

During Autumn 2013 and 2014, the average yield per plant of *Quercus serrata* recorded .

Treatment A - (Control)- 0.420 Kg per plant and 2824.00Kg per hectare when not applied any input.

Treatment B - 0.630 Kg per plant and 4236.00 Kg per hectare when applied 48.0 gm Urea, 46.5gm SSP and 9.3 gm MOP and 10Kg FYM per plant.

Treatment C - 0.530 Kg per plant and 3563.00 Kg per hectare when applied 10Kg FYM only.

Average leaf yield was found in Spring season per plant of *Quercus serrata* (1.53Kg) and per hectare 10355.00 Kg and Autumn season 0.630Kg per plant and per hectare 4236.00Kg when applied Chemical fertilizer and FarmYard Manure. The leaf yield found more other than treatment. Hence, to increasing more quantitative of leaf in per plant and per hectare plantation of *Q.serrata* was found very much essential to increasing rearing capacity of silkworm rearing per unit area.

Table 3: Average Leaf yield of per plant (*Quercus serrata*) and per hectare with application of FYM and NPK in 2013 and 2014 in Spring and Autumn season:

Season	Treatment	Average Leaf yield per plant			Average Leaf yield per hectare Kg.(6724 plant /hectare)
		Average. Leaf yield per plant (kg)2013	Average Leaf yield per plant (kg)2014	Average Leaf yield per Plant 2013 and 2014	
Spring	(A) Control(without FYM and NPK)	1.176	1.13	1.15	7752.00
	(B) N P K FYM 150 50 38 7000 Kg hectare (Urea- 48.0gm; SSP-46.5gm; MOP-9.3gm;FYM-10 Kg per plant)	1.56	1.50	1.53	10355.00
	(C) N P K FYM 0 0 0 7000 Kg (FYM-10Kg per plant)	1.328	1.312	1.32	8875.00
Autumn	(A) Control(without FYM and NPK	0.423	0.412	0.42	2824.00
	(B) N P K FYM 150 50 38 7000 Kg hectare (Urea- 48.0gm; SSP-46.5gm; MOP-9.3gm;FYM-10 Kg per plant)	0.642	0.618	0.63	4236.00
	(C) N P K FYM 0 0 0 7000 Kg (FYM-10Kg per plant)	0.531	0.516	0.53	3563.00

N- Nitrogen (Urea) ; P- Phosphate(Single Super Phosphate); K- Potash (Murate of Potash) ; FYM- Farm Yard Manure

Photo Plate No 1: (a)Showing *Quercus serrata* plantation to study leaf yield, *A.proylei* **J.** silkworm rearing, biochemical analysis of leaf, study myco-flora from phylloplane, rhizosphere, non-rhizosphere, rhizoplane of soil and from over air. (b) Seedlings for study myco-flora from rhizosphere and non rhizosphere soil.

4.1.2. Average leaf yield of per plant of *Q.serrata.*

Table: 4 Average yield of per plant (*Quercus serrata)* in Spring and Autumn season in 2013 and 2014 under different treatments.

Treatment / Replication	Spring 2013 and 2014			Autumn 2013 and 2014		
	Control (Kg)	NPK+FYM (Kg)	FYM (Kg)	Control (Kg)	NPK+FYM (Kg)	FYM (Kg)
R1	1.18	1.59	1.321	0.41	0.65	0.55
R2	1.05	1.52	1.36	0.45	0.61	0.53
R3	1.22	1.48	1.28	0.43	0.63	0.51
R4	1.10	1.45	1.34	0.44	0.67	0.50
R5	1.13	1.61	1.30	0.41	0.60	0.52
R6	1.22	1.53	1.32	0.40	0.62	0.57
R7	1.20	1.52	1.42	0.38	0.63	0.48
R8	1.18	1.64	1.20	0.425	0.61	0.53
R9	1.18	1.43	1.34	0.38	0.65	0.58
R10	1.07	1.53	1.32	0.425	0.63	0.53
Total	11.53	15.30	13.20	4.15	6.30	5.30
Mean	1.15	1.53	1.320	0.42	0.63	0.53
SED(±)	0.00209			0.00032		
CD(5%)	0.03262			0.00056		

Leaf yield of *Q. serrata* in the Spring and Autumn season statistically analysis. In Spring season SED(±) 0.00209 and CD(5%) 0.03262 and Autumn season SED(±) 0.00032 and CD(5%) 0.00056.

The leaf yield of *Q. serrata* in both Spring and Autumn season during 2013 and 2014. However, leaf yield was found to be much higher in Spring than in Autumn season. The highest average leaf yield (1.53 Kg) was recorded in plants applied with FYM and NPK.

4.2. The Meteorological data recorded during the rearing seasons of *Antheraea proylei* **Jolly.** in Spring and Autumn season in 2013 and 2014 .

- In 2013(Spring season) average temperature maximum and minimum was recorded 31.06° C and 18.05°C, relative humidity maximum 70.86 % , minimum 55.41% and rainfall 427mm in 9 days.
- In 2013 (Autumn season) average temperature maximum 31.81^0 C, minimum 22.46 ^{0}C, relative humidity maximum 83.03%,minimum 55.79%, rainfall 817 mm. in 22 days.
- In 2014 (Spring season) average temperature maximum 29.43°C, minimum 17.50°C, relative humidity maximum 64.98% , minimum 53.57%,rainfall 273 mm. in 5 days.
- In 2014 (Autumn season) average temperature maximum 27.62°C,minimum 23.28°C, relative humidity86.57%, minimum 54.14%, rainfalls 1071 mm. in 16 days.
- In Autumn season minimum temperature and relative humidity was recorded slightly higher than Spring season and rainfalls also recorded more in millimeter and increased nos days.
- The minimum temperature, less maximum humidity and less rainfalls in the Spring season was recorded which got positive impact on silkworm rearing

Table 5: Meteorological record of Oak tasar crop at Umrangso during Spring and Autumn season in 2013 and 2014.

Crop season	Temperature. °C		Relative humidity %		Total rainfalls (millimeter)	No. of rainy days
	Maximum	Minimum	Maximum	Minimum		
2013 - Spring March-April	31.06	18.05	70.86	55.41	427	9
2013 – Autumn Sept-Oct	31.81	22.46	83.03	55.79	817	22
2014 - Spring March-April	29.43	17.50	64.98	53.57	273	5
2014 – Autumn Sept-Oct	27.62	23.28	86.57	54.14	1071	16

4.3 Rearing performance of *A.proylei* J. under different treatment in 2013 and 2014.

4.3.1 In Spring season rearing performance of *A.proylei* **J.** without NPK and FYM application(Control) larval period 36-43days, mature larval weight male14.8gm,female 15.8 gm, cocoon weight male 4.88 gm, female 5.60 gm, shell weight male 0.44 gm, female 0.50 gm, silk ratio of male 9.0%, female 8.83% and average silk ratio(SR)8.98% was found. In Autumn season larval period 38-46 days, mature larval weight male 14.76 gm, female 15.7gm,ERR 16.2%, average cocoon weight male 4.82gm, female 5.55 gm, average shell weight 0.44 gm, female 0.48 gm, silk ratio male 9.22%, female 8.65 gm, average SR 9.18% .

Table 6: Rearing Performance of *Antheraea proyeli* Jolly. without NPK and FYM application (Control) in 2013 and 2014.

Crop	No. of Worm brushed	Larval period (days)	Mature larval weight (gm)		Average cocoon weight (gm)		Average Shell weight (gm)		Shell ratio (%)		Average Shell ratio (%)
			♂	♀	♂	♀	♂	♀	♂	♀	
Spring 2013	1000	36-43	14.82	15.90	4.86	5.49	0.44	0.49	9.05	8.92	8.98
Spring 2014	1000	36-43	14.77	15.82	4.91	5.71	0.44	0.50	8.96	8.75	8.84
Average	36-43		14.8	15.86	4.88	5.60	0.44	0.50	9.00	8.83	8.98
Autumn 2013	1000	38-46	14.78	15.71	4.83	5.36	0.44	0.48	9.11	8.95	9.03
Autumn 2014	1000	38-46	14.74	15.80	4.82	5.75	0.45	0.48	9.34	8.35	9.34
Average	38-46		14.76	15.75	4.82	5.55	0.44	0.48	9.22	8.65	9.18

4.3.2. In Spring season rearing performance of *A.proylei* **J.** with application of NPK and FYM, larval period 34-38 days, average mature larval male15.70gm,female 17.01 gm, cocoon weight male 5.52gm, female 6.97 gm, shell weight male 0.535 gm, female 0.705 gm, silk ratio male10.15%,female 10.12% ,average SR 10.15% were recorded. In Autumn season larval period 34-40 days, mature larval male 15.66 gm, female 17.01gm,cocoon weight 5.04 gm, female 6.76 gm , shell weight male 0.495 gm, female 0.635 gm, silk ratio male9.79% female 9.40%, average silk ratio SR 9.60%.

Table 7: Rearing Performance of *Antheraea proyeli* Jolly. with application of NPK and FYM in 2013 and2014.

Crop	No. of Worm brushed	Larval period (days)	Mature larval weight (gm)		Average cocoon weight (gm)		Average Shell weight (gm)		Shell ratio (%)		Avg Shell ratio (%)
			♂	♀	♂	♀	♂	♀	♂	♀	
Spring 2013	1000	34-38	15.72	17.10	5.26	7.00	0.534	0.71	10.20	10.14	10.20
Spring 2014	1000	34-38	15.69	16.92	5.25	6.95	0.533	0.70	10.10	10.10	10.10
Average	34-38		15.70	17.01	5.25	6.97	0.535	0.705	10.15	10.12	10.15
Autumn 2013	1000	34-40	15.67	17.07	5.03	6.90	0.49	0.64	9.74	9.30	9.52
Autumn 2014	1000	34-40	15.65	16.96	5.05	6.63	0.50	0.63	9.84	9.50	9.67
Average	34-40		15.66	17.01	5.04	6.76	0.495	0.635	9.79	9.40	9.60

4.3.3. In Spring rearing performance of *A.proylei* **J.** with application of FYM, larval period 34-40 days, mature larval weight male15.24 gm, female 16.26 gm, cocoon weight male 4.97 gm, female 6.57 gm, shell weight male 0.48 gm, female 0.625 gm. silk ratio male 9.65% ,female 9.51% ,average SR 9.60% were found. In Autumn season larval period 38-45 days , mature larval weight male 15.08 gm, female 16.12gm, cocoon weight male 4.92 gm, female 6.48 gm, shell weight 0.48 gm, female 0.595 gm., silk ratio male 9.75%,female 9.17,average SR 9.46% were recorded.

Table 8:Rearing Performance of *Antheraea proyeli* Jolly. with application of FYM in 2013 and 2014.

Crop	No. of Worm brushed	Larval period (days)	Mature larval weight (gm)		Average cocoon weight (gm)		Average Shell weight (gm)		Shell ratio (%)		Average Shell ratio (%)
			♂	♀	♂	♀	♂	♀	♂	♀	
Spring 2013	1000	34-40	15.19	16.32	5.02	6.59	0.48	0.63	9.60	9.56	9.60
Spring 2014	1000	34-40	15.30	16.22	4.92	6.55	0.48	0.62	9.71	9.46	9.60
Average	34-40		15.24	16.26	4.97	6.57	0.48	0.625	9.65	9.51	9.60
Autumn 2013	1000	38-44	15.13	16.18	4.97	6.57	0.48	0.60	9.66	9.13	9.4
Autumn 2014	1000	38-46	15.04	16.06	4.88	6.40	0.48	0.59	9.84	9.22	9.53
Average	38-45		15.08	16.12	4.92	6.48	0.48	0.595	9.75	9.17	9.46

Among all the treatment rearing performance was found better (ERR 64.5% and SR 10.15% in Spring season) and in Autumn season (ERR 31.6% and SR 9.60%) when with application of NPK and FYM. and it was found that larval period short, mature larval weight, cocoon weight, shell weight more significant.

Photo plate No:**7(a)** cellular rearing and different larval stage of *Antheraea proylei* **Jolly. 7(b)** 1st instar, **7(c)** 2nd instar, **7(d)** 3rd instar, **7(e)** 4th instar and**7(f)** 5th instar), **8(a)** silkworm rearing of *Antheraea proylei* **Jolly. 8(b)**yellow, **8(c)**green and **8(d)**blue; **9**Silkworm rearing of *Antheraea proylei* **Jolly.** yellow colour), **10** silkworm moths **10(a)** male moth **10(b)** female moth, **10(c)** egg, DFL and **10(d)** cocoons of *Antheraea proylei* **Jolly.**)

Table: 9 Effective rate of rearing(ERR%) of *A.proylei* during 2013 and 2014 under different treatments.

Treatment Replication	Spring 2013 and 2014			Autumn 2013 and 2014		
	Control (%)	NPK+FYM (%)	FYM (%)	Control (%)	NPK+FYM (%)	FYM (%)
R1	36.0	63.5	40.5	18.0	36.0	25.0
R2	31.0	64.5	47.5	16.0	34.5	26.5
R3	30.0	60.5	44.5	17.0	31.5	24.5
R4	35.0	68.5	43.5	14.0	34.0	20.5
R5	38.0	70.5	43.0	12.5	32.5	22.0
R6	32.0	57.0	46.0	16.5	30.0	20.0
R7	30.0	56.5	48.0	18.5	30.0	23.5
R8	26.5	64.5	42.5	18.0	28.5	28.0
R9	24.0	68.5	43.5	15.5	31.5	22.5
R10	32.5	71.0	36.0	16.0	28.0	26.0
Total	315.00	645.00	435.00	162.00	316.50	238.50
Mean	31.50	64.50	43.50	16.2	31.65	23.85
SED(±)	10.203			2.56		
CD(5%)	17.692			4.435		

Effective rate of rearing(ERR%) of *A.proylei* during 2013 and 2014 under different treatments without application of FYM and NPK(Control) is 31.5% , application of NPK and FYM is 64.5% and the application of FYM is 43.5% in spring season. The effective rate of rearing application of FYM and NPK (Control) is 16.2%, application of NPK and FYM is 31.65% and the application of FYM is 23.85% in autumn season. The ERR % showed highly significant difference amongst in both Spring and Autumn crop rearing 2013 and 2014. ERR% was found

much higher in Spring season rearing than in Autumn crop rearing. Highest average ERR% of *A. proylei* **J**. was recorded 64.50% where the rearing was conducted those plants applied with Farm yard manure and chemical fertilizer NPK.

4.4 Isolation and identification of species from Phylloplane, Rhizosphere, Non-rhizosphere, Rhizoplane and Air Mycoflora of *Q.serrata* during Spring and Autumn in 2013 and 2014.

4.4.1 Qualitative and quantitative study of phylloplane Mycoflora of *Q.serrata* leaves during Spring and Autumn season of Oak tasar silkworm rearing (*Antheraea proylei* **Jolly.**) at Umrangso, Research Extension Centre, Farm. Eleven fungal species were isolated from the leave surface of *Q.serrata*. The types of fungi which colonized the leaves at different stages of maturation viz. Tender, Semi-mature and Mature leaves, on the both side of leaves in the Spring and Autumn season.

i) <u>Spring season 2013 and 2014</u>

In spring season on the upper surface of tender leaves fungal species were isolated *i.e. Aspergillus niger*) 70.50 – 72.50% (P.P.No 2a and 2b, *Alternaria alternata* 17.0 – 18.0%(P.P.No 3c), *Mucor* sp 10.5 – 11.5%(P.P.No 5a) , and on lower surface *Aspergillus niger* 65.5 – 66.5%, *Alternaria alternata* 12.5 – 13.5%, *Mucor* sp 10.5 – 11.5%, and *Curvularia* sp 9.5 – 10.5%(P.P.No 4a) . On the upper surface of semi-mature leaves *Aspergillus niger* 60.5 – 61.5%, *Alternaria alternata* 15.5 – 17.5%, *Mucor* sp 12.5 – 14.5%, and *Curvularia* sp 8.5 – 9.5%. were isolated, like that on lower surface of the semi-mature leaves *Aspergillus niger* 57.5 - 58%, *Alternaria alternata* 15.5 – 16.5%, *Mucor* sp 10.5 – 12.5%, and *Curvularia* sp 8.5 – 9.5%. and *Fusarium* sp 5.0 – 6.5% (P.P.No 4c) on upper surface of mature leaves *Aspergillus niger* 54.0 – 55.5%, *Alternaria alternata* 22.5 – 23.5%, *Mucor* sp 10.5 – 12.5%, and *Curvularia* sp 3.5 – 4.0%. and *Fusarium* sp 6.0 – 8.0% were isolated but on the lower surface of mature leaves more number of fungal species were isolated *i.e. Aspergillus niger* 44.0 – 45.5%, *A.fumigatus* 16.0 – 16.5% (P.P.No 3a and 3b) *A.flavus* 3.5 – 5.0% (P.P.No 2c and 2d) ,*Alternaria alternata* 12.0 – 12.5%, *Mucor* sp 8.0 – 10.0%, and *Curvularia* sp 5.5 – 7.5% and *Fusarium* sp 6.5 – 7.5%.(Table:10,Fig:2).

ii) Autumn season 2013 and 2014

Upper surface of tender leaves *Aspergillus niger* 55.0 – 55.5%, *A.fumigatus*14.5 – 16.5%, *Alternaria alternata* 15.5 – 16.5%, *Mucor* sp 12.5– 14.0%, and lower surface of mature leaves *Aspergillus niger* 51.0 – 52.5%, *A.fumigatus* 18.0 – 19.5%, *Alternaria alternata* 15.5 – 17.0%, *Mucor* sp 6.5– 7.5%, *Fusarium* sp 6.0 – 6.5%, on the upper surface of semi-mature leaves *Aspergillus niger* 51.5 – 52.5%, *A.fumigatus*16.0 – 17.5%, *Alternaria alternata* 13.5 – 14.0%, *Mucor* sp 7.5– 8.5%, *Penicillum* sp 8.0 – 10.0% (P.P.No 4d and 4e), and on the lower surface *Aspergillus niger* 45.5 – 47.5%, *A.fumigatus*14.0 – 15.5%, *Alternaria alternata* 12.5%, *Mucor* sp 6.0– 6.5%, *Penicillum* sp 6.5 – 8.0%, *Curvularia* sp 8.0– 9.0%, *Fusarium* sp 4.0 – 4.5%, were isolated.

On the upper surface of mature leaves *Aspergillus niger* 44.0-45.5%, *A.fumigatus* 9.5-11.0%, *A.flavus* 4.0-4.5%, *Alternaria alternata* 15.5-16.5%, *Curvularia* sp 4.5-5.5%, *Penicillum* sp 5.0-6.0%, *Fusarium* sp 4.5-5.5%, *Verticillium* sp 4.5-5.0%, *Mucor* sp 4.0-4.5% and on the lower surface of mature leaves a total eleven numbers of fungal species were isolated *i.e. Aspergillus niger* 44.5-45.5%, *A.fumigatus* 6.0-6.5%, *A.flavus* 3.5-4.0%, *Alternaria alternata* 14.5-15.5%, *Mucor* sp 3.0-4.0%, *Curvularia* sp 4.0-4.5%, *Penicillum* sp 5.5-7.0%, *Verticillium* sp 3.0-3.5%,*Fusarium* 4.5-5.5%, *Colletotrichum* sp 3.5-4.5%(P.P.No 5b) , *Cladosporium* sp 3.5-4.0% (P.P.No 3d and 3e) (Table:11 and Fig:3).

Photo Plates No(P.P.No): **2 (a)** *Aspergillus niger* culture in petridish **2(b)***Aspergillus niger* spore with conidiophores, **2 (c)** *Aspergillus flavus* culture in petridish , **2(d)***Aspergillus flavus* spore with conidiophores., **3(a)** *Aspergillus fumigatus* culture in petridish, **3(b)** *Aspergillus fumigatus* conidiophores, **3(c)** *Alternaria alternata* conidia ,**3(d)** *Cladosporium* sp culture in petridish, **3(e)** *Cladosporium* spores, **4(a)** *Curvularia* sp conidiophores, **4(b)** *Fusarium solani* culture in petridish, **4(c)** *Fusarium* sp spore,**4(d)** *Penicillum* sp culture in petridish and **4(e)***Penicillum* sp conidiophores.; **5(a)** *Mucor* sp culture in petridish, **5(b)** *Colletotrichum* sp spore. **6(a)** *Rhizopus* sp culture in petridish **6(b)** *Rhizopus* sp spore ; showing different fungal isolated from phylloplane, rhizosphere, non-rhizosphere, rhizoplane soil, over air of *Quercus serrata* plantation and fungal isolated from rhizosphere and non-rhizosphere soil of *Quercus serrata* seedlings.

Table 10: Fungal isolates of leaf surface of *Quercus serrata* at different status of age during Spring crop (March –April) 2013 and 2014.

Status of leaves	Surface	No. of Sampling	Fungal Isolates	Relative abundance %	
					2014
Tender	Upper	10 nos	*Aspergillus niger*	70.50	72.50
			Alternaria alternata	18.0	17.0
			Mucor sp	11.5	10.5
	Lower	10 nos	*Aspergillus niger*	65.5	66.5
			Alternaria alternata	12.5	13.5
			Mucor sp	11.5	10.5
			Curvularia sp	10.5	9.5
Semi-mature	Upper	10 nos	*Aspergillus niger*	61.5	60.5
			Alternaria alternata	15.5	17.5
			Mucor sp	14.5	12.5
			Curvularia sp	8.5	9.5
	Lower	10 nos	*Aspergillus niger*	57.5	58.0
			Alternaria alternata	15.5	16.5
			Mucor sp	12.5	10.5
			Curvularia sp	9.5	8.5
			Fusarium sp	5.0	6.5
Mature	Upper	10 nos	*Aspergillus niger*	55.5	54.0
			Alternaria alternata	22.5	23.5
			Mucor sp	12.5	10.5
			Curvularia sp	3.5	4.0
			Fusarium sp	6.0	8.0
	Lower	10 nos	*Aspergillus niger*	45.5	44.0
			A.fumigatus	16.5	16.0
			A.flavus	3.5	5.0
			Alternaria alternata	12.5	12.0
			Mucor sp	10.0	8.0
			Curvularia sp	5.5	7.5
			Fusarium sp	6.5	7.5

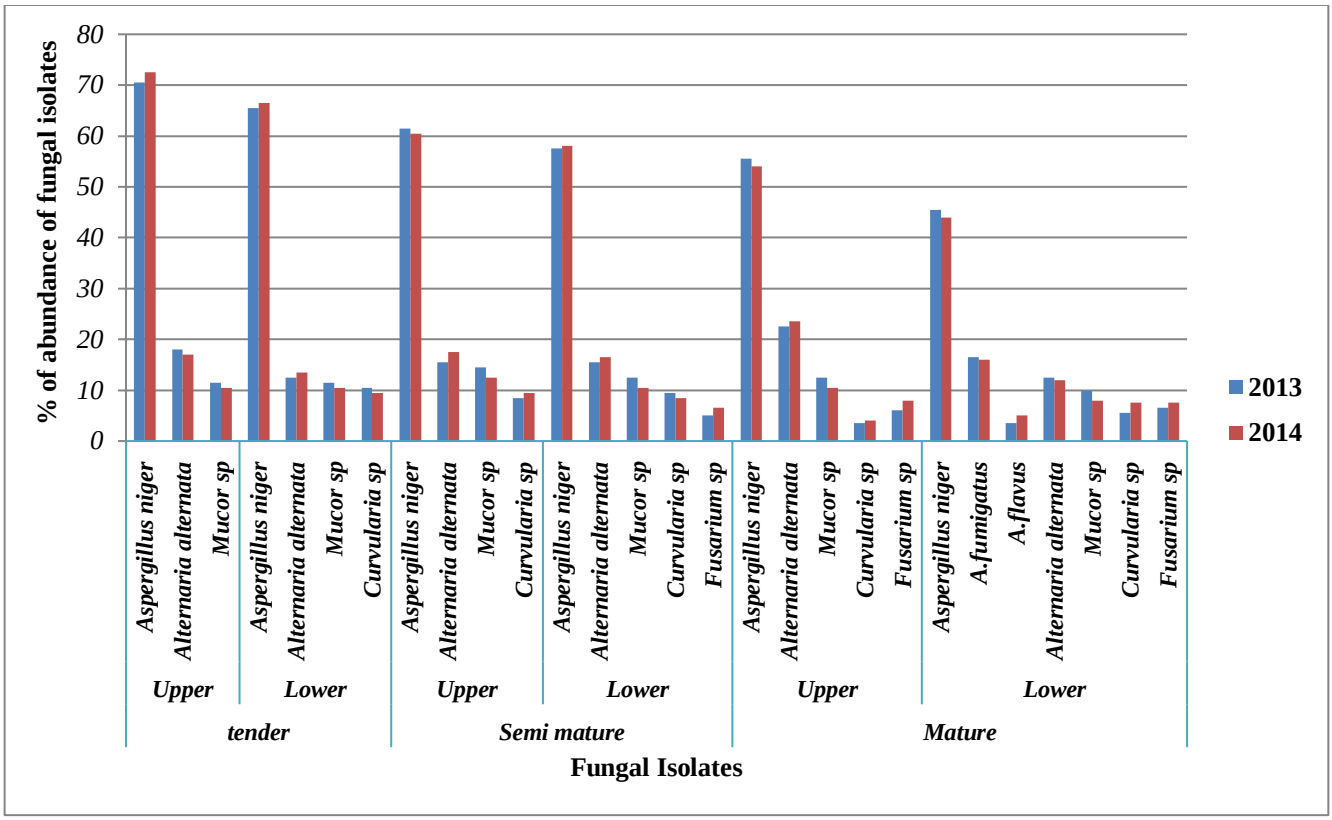

Fig 2: Fungal isolates of leaf surface of *Quercus serata* at different status of age Spring crop (March –April) 2013 and 2014.

Table 11:Fungal isolates of leaf surface of *Quercus serrata* at different status of age during Autumn crop (Sept-Oct.)2013 and 2014.

Status of leaves	Surface	No.of Sampling	Fungal Isolates	Relative abundance %	
				2013	2014
Tender	Upper	10 nos	*Aspergillus niger*	55.5	55.0
			A.fumigatus	16.5	14.5
			Alternaria alternata	15.5	16.5
			Mucor sp	12.5	14.0
	Lower	10 nos	*Aspergillus niger*	52.5	51.0
			A.fumigatus	19.5	18.0
			Alternaria alternata	15.5	17.0
			Mucor sp	6.5	7.5
			Fusarium sp	6.0	6.5
Semi - mature	Upper	10 nos	*Aspergillus niger*	52.5	51.5
			A.fumigatus	17.5	16.0
			Alternaria alternata	13.5	14.0
			Mucor sp	8.5	7.5
			Penicillum sp	8.0	10.0
	Lower	10 nos	*Aspergillus niger*	45.5	47.5
			A.fumigatus	15.5	14.0
			Alternaria alternata	12.5	12.5
			Mucor sp	6.5	6.0
			Penicillum sp	6.5	8.0
			Curvularia sp	9.0	8.0
			Fusarium sp	4.5	4.0
Mature	Upper	10 nos	*Aspergillus niger*	45.5	44.0
			A.fumigatus	9.5	11.0
			A.flavus	4.5	4.0
			Alternaria alternata	15.5	16.5
			Curvularia sp	5.5	4.5
			Penicillum sp	5.0	6.0
			Fusarium sp	5.5	4.5
			Verticillium sp	4.5	5.0
			Mucor sp	4.5	4.0
	Lower	10 nos	*Aspergillus niger*	45.5	44.5
			A.fumigatus	6.5	6.0
			A.flavus	3.5	4.0
			Alternaria alternata	14.5	15.5
			Mucor sp	4.0	3.0
			Curvularia sp	4.5	4.0
			Penicillum sp	5.5	7.0
			Verticillium sp	3.5	3.0
			Fusarium sp	5.5	4.5
			Colletotrichum sp	3.5	4.5
			Cladosporium sp	3.5	4.0

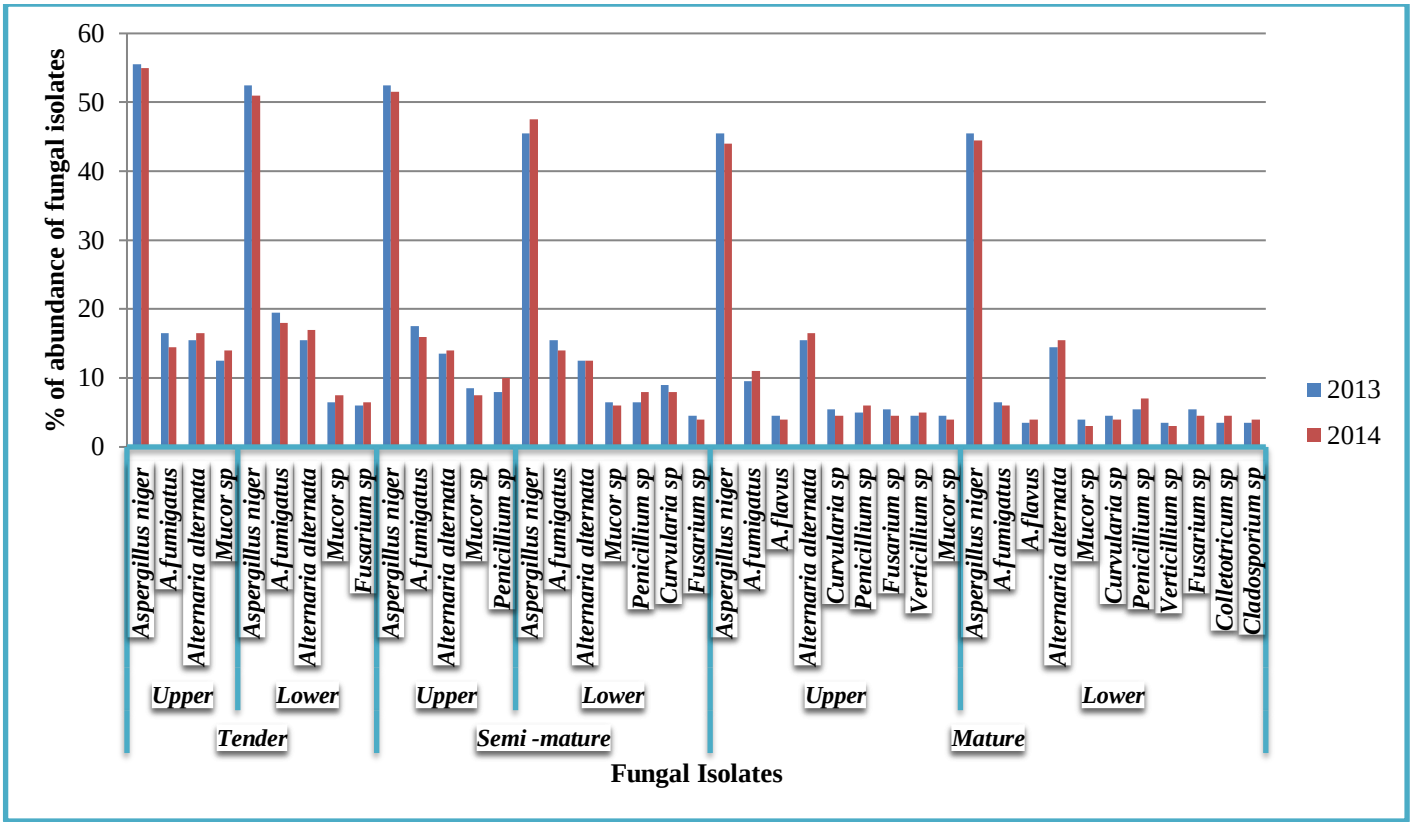

Fig 3: Fungal isolates of leaf surface of *Quercus serata* at different status of age during Autumn crop (Sept-Oct.)2013 and 2014.

The fungal species of *Aspergillus*, particularly *Aspergillus niger* was found to be most dominant in the three stages of growth during all seasons. *Aspergillus fumigatus* was found co-dominant in lower surface of mature leaves in Spring season and both surface of tender and semi-mature leaves in Autumn season. It was also found that *Alternaria alternata* co-dominant in the both leaf surface of tender and semi-mature leaves and upper surface of mature leaves in Spring season. *Penicillum* sp was found in the both side of semi-mature and mature leaves in Autumn season.

4.4.2. Qualitative and quantitative estimation of fungal population of soil from *Quercus serrata* seedlings at Umrangso REC Farm during 2013 and 2014.

Seedling soil: Ten fungal species were isolated from the soil of *Quercus serrata* seedling during the investigation period. (Table:12). The seedlings were 6 month and 1 year old raised in seedling beds. It takes 21-28 days for the *Quercus serrata* seeds to germinate under the climatic conditions of Umrangso. The seeds were sown in 4th week of February to 2nd week of March and same ages of seedling are taken for investigation during Spring and Autumn seasons. Among the isolated species *Alternaria alternata, Aspergillus flavus, Aspergillus niger, Fusarium oxysporium, Penicillum* sp and *Trichoderma* sp was found in both rhizosphere and non rhizosphere soil throughout the study period while *Fusarium solani* observed in rhizosphere soil. *Cladosporium* sp, *Collectotrichum* sp observed in rhizosphere and non rhizosphere soil during Autumn season (September-October), but *Mucor hiemalis* found only in rhizosphere soil in autumn season (P.P.No :2-6). *Aspergillus niger* was found dominant in both rhizosphere and non rhizosphere soil during Spring and Autumn season. *Aspergillus flavus* was found co-dominant followed by *Alternaria alternata, Fusarium solani, Fusarium oxysporium* and *Trichoderm* sp were co-dominant during Spring season in rhizosphere soil but *Aspergillus niger* and *Penicillum* sp *was* found dominant in non- rhizosphere soil and *Aspergillus flavus, Alternaria alternata, Fusarium oxysporium* and *Trichoderm* sp were found co-dominant during Spring season. *Fusarium solani* and *Fusarium oxysporium* were found co-dominant followed by *Aspergillus flavus* and *Mucor hiemailis*, than *Alternaria alternata, Cladosporium* sp, *Penicillum* sp and *Trichoderma* sp in rhizosphere soil in Autumn season. *Colletotrichum* sp showed lower occurrence in both season in both rhizosphere and non-rhizosphere soil.

Table 12: Relative abundance% Fungal isolates of RS and NRS of (*Quercus serrata)* seedlings during Spring and Autumn season during 2013 and 2014.

Sl. No	Fungal Isolates	Relative abundance%								REMARKS
		2013				2014				
		March –April Spring		Sept.-Oct Autumn		March –April Spring		Sept.-Oct Autumn		
		RS	NRS	RS	NRS	RS	NRS	RS	NRS	
1	*Alternaria alternata*	11.5	14.5	8.0	14.0	11.5	14.3	8.5	14.3	
2	*Aspergillus flavus*	18.0	14.5	8.5	15.0	20.0	14.3	8.5	14.3	
3	*Aspergillus niger*	29.5	21.0	21.5	19.5	29.5	21.5	21.0	19.0	Dominant
4	*Cladosporium* sp	0.0	0.0	8.0	9.5	0.0	0.0	8.5	9.5	
5	*Colletotrichum* sp	0.0	0.0	4.5	4.5	0.0	0.0	4.0	4.8	
6	*Fusarium solani*	11.5	0.0	12.5	0.0	10.5	0.0	12.0	0.0	
7	*Fusarium oxysporium*	11.5	14.5	12.5	9.5	10.5	14.3	12.0	9.5	
8	*Mucor hiemalis*	0.0	0.0	8.5	0.0	0.0	0.0	8.5	0.0	
9	*Penicillum* sp	6.5	21.0	8.0	14.0	6.5	21.5	8.5	14.3	
10	*Trichoderma* sp	11.5	14.5	8.0	14.0	11.5	14.1	8.5	14.3	

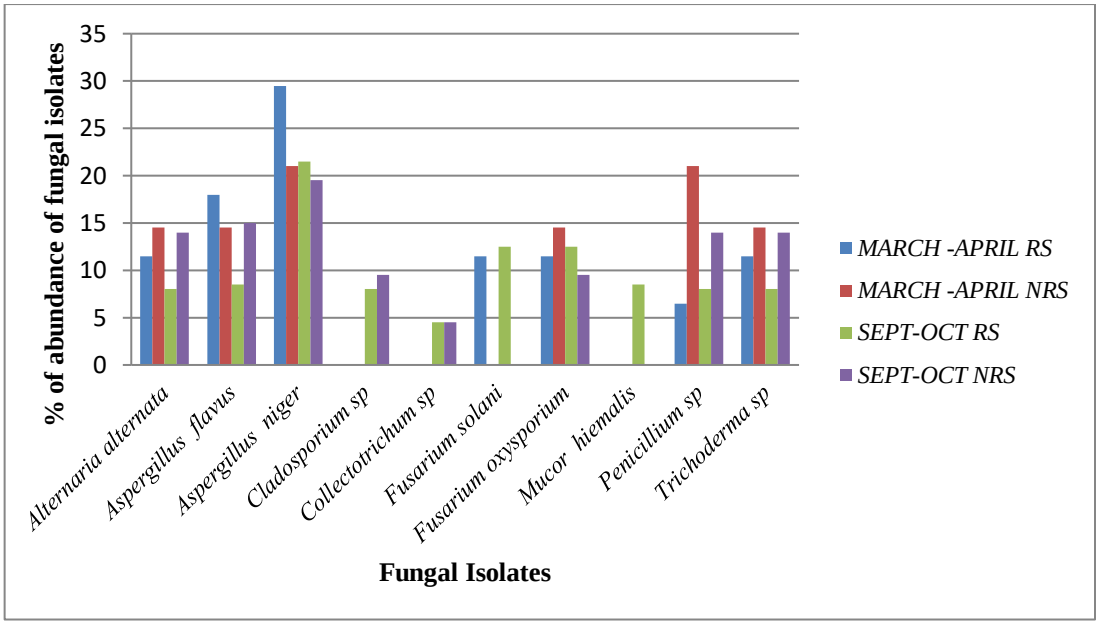

Fig 4: Showing fungal isolates of RS and NRS of *Quercus serrata* seedlings during Spring (March-April) and Autumn (September-October)2013.

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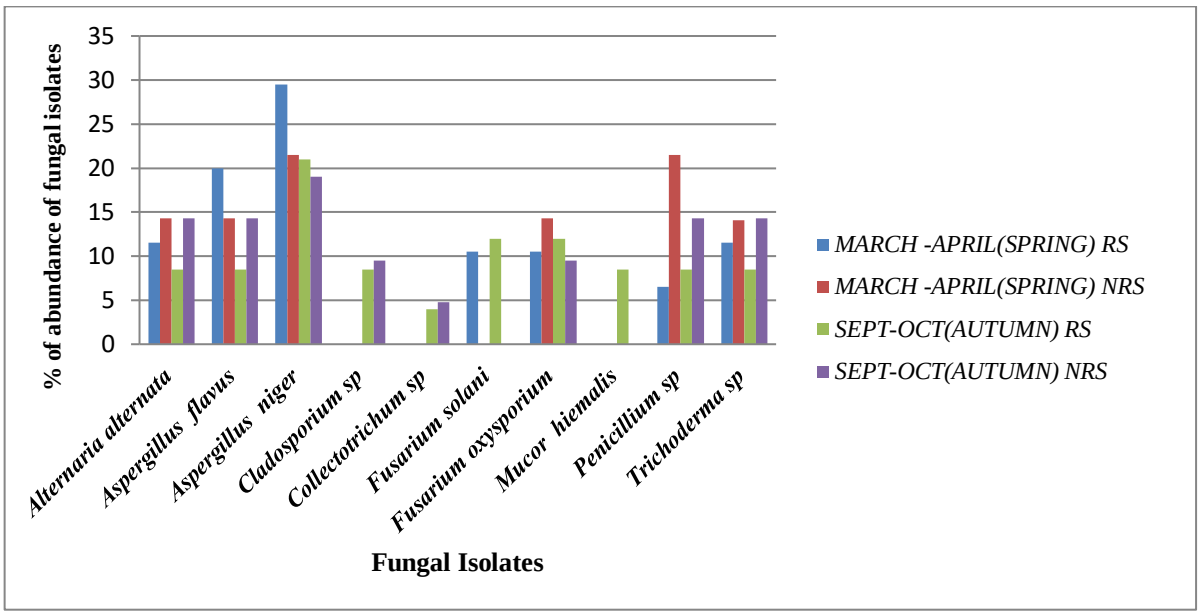


Figure 5: Showing fungal isolates of RS and NRS of *Quercus serrata* seedlings during Spring (March-April) and Autumn (September-October) 2014

4.4.3. Qualitative and quantitative estimation of fungal population of soil from *Quercus serrata* plantation at Umrangso REC Farm.

Mature plants soil: A total of sixteen fungal species were isolated from the soil of *Quercus serrata* plantation at Umrangso REC Farm during 2013 and 2014 (Table:13,14) In Spring season *Aspergillus flavus, Aspergillus fumigatus, Aspergillus niger, Alternaria alternata, Curvularia* sp. *Cladosporium cladosporides, Cladosproium herbarum, Colletotrichum gloeosporiodes, Fusarium solani, Fusarium oxysporium, Trichoderma harizanum Aureobasidium pullulans, Mucor* sp, *Penicellium* sp and Sterile mycelia in *rhizosphere* soil. *Aspergillus flavus. A.fumigatus , A.niger, Alternaria alternata, A.pullulans, Curvularia* sp *Cladosporium clodosporides, Cladosporium herbarum, Fusarium* sp, *Penicillum* sp *Trichoderma harzianum, Mucor* sp, *Gliocladium* sp and *Sterile mycelia* in non–rhizosphere soil. But *Cladosporium herbarum* and *Gliocladium* sp were not found in rhizoplane soil. *Aspergillus* sp was dominant in all rhizosphere, non-rhizosphere and rhizoplane soil in spring season, followed by *Fusarium* sp.

A total eighteen fungal species were isolated from the soil of *Q.serrata* plantation in autumn season. *Aspergillus flavus, A.fumigatus, A.niger, A.terreus, Aspergillus* sp, *Alternaria alternata, Alternaria* sp, *Aureobasidium pullants, Curvularia* sp, *Cladosporium clodosporides, Cladosporium herbarum, Fusarium solani, Fusarium oxysporium, Mucor* sp, *Penicillum* sp, *Rhizopus* sp (P.P.No 6a and 6b), *Trichoderma harizanum* and Sterile mycelia in RS soil, *Cladosporium clodosporides* in NRS and *Cladosporium herbarum* were not found in RP soil. *Aspergillus* was dominant in all rhizosphere, non-rhizosphere and rhizoplane, followed by *Fusarium*> *Alternaria*> *Penicillum* sp> *Trichoderma, etc.*

Table 13: Relative abundance% Fungal isolates of RS, NRS and RP soil of *Quercus serrata* plantation during Spring season 2013 and 2014.

Sl.No.	Fungal isolates	Relative abundance %						Remarks
		2013			2014			
		RS	NRS	RP	RS	NRS	RP	
1	*Alternaria alternata*	9.0	6.0	5.5	9.0	6.6	5.6	
2	*Aspergillus flavus*	13.5	10.0	11.0	13.0	10.0	11.2	
3	*Aspergillus fumigatus*	7.0	8.0	8.5	7.0	6.6	8.3	
4	*Aspergillus niger*	13.5	18.0	14.0	15	16.8	13.9	Dominant
5	*Aureobasidium pullulans*	4.5	4.0	5.5	4.5	3.4	5.6	
6	*Curvularia* sp	2.5	4.0	8.5	2.0	3.4	8.3	
7	*Clado sporium clodosporides*	4.5	4.0	3.0	4.5	3.4	2.7	
8	*Clado sporium herbarum*	4.5	10.0	0.0	4.5	10.0	0.0	
9	*Collectotrichum gloeosporiodes*	4.5	7.0	5.5	4.5	6.6	5.6	
10	*Fusarium solani*	9.0	0.0	11.0	9.0	0.0	11.2	
11	*Fusarium oxysporium*	7.0	7.0	8.5	7.0	6.6	8.3	
12	*Mucor* sp	4.5	4.0	8.5	4.5	3.4	8.3	
13	*Penicillum* sp	4.5	4.0	5.5	4.5	6.6	5.6	
14	*Gliocladium* sp	0.0	4.0	0.0	0.0	3.4	0.0	
15	*Trichoderma harizanum*	7.0	6.5	2.5	7.0	6.6	2.7	
16	*Sterile mycelia*	4.5	3.5	2.5	4.0	6.6	2.7	

- **RS: Rhizosphere; NRS: Non. Rhizosphere** ; **RP: Rhizoplane**

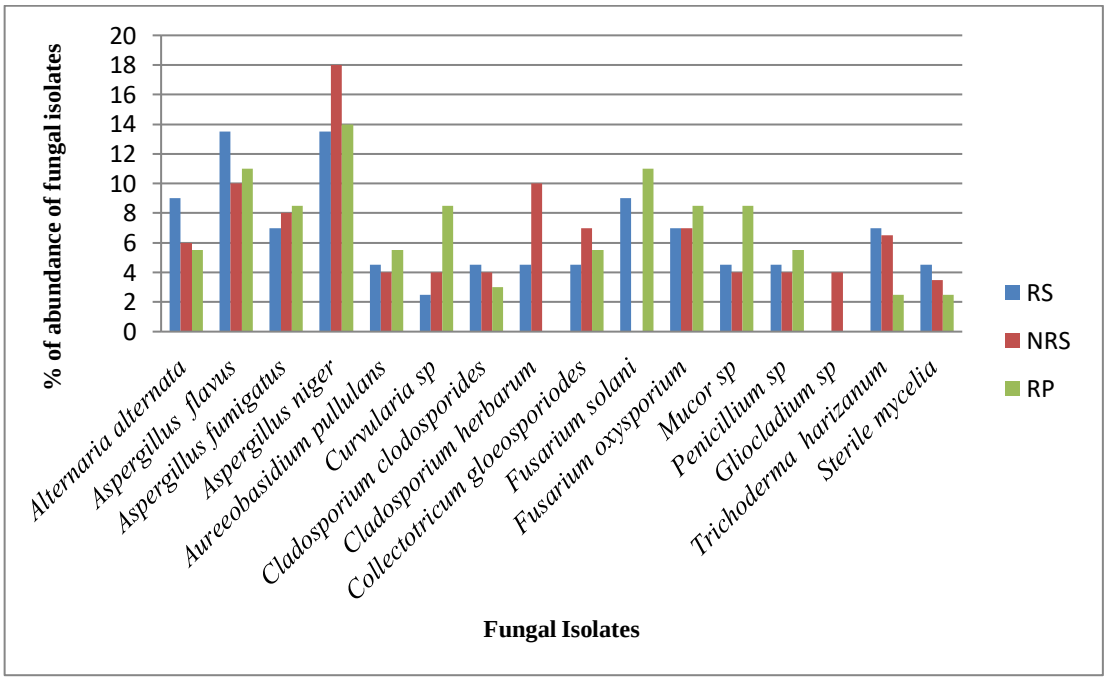


Fig 6: Fungal population density of plantation (*Quercus serrata*) soil in Spring (March-April) in 2013.

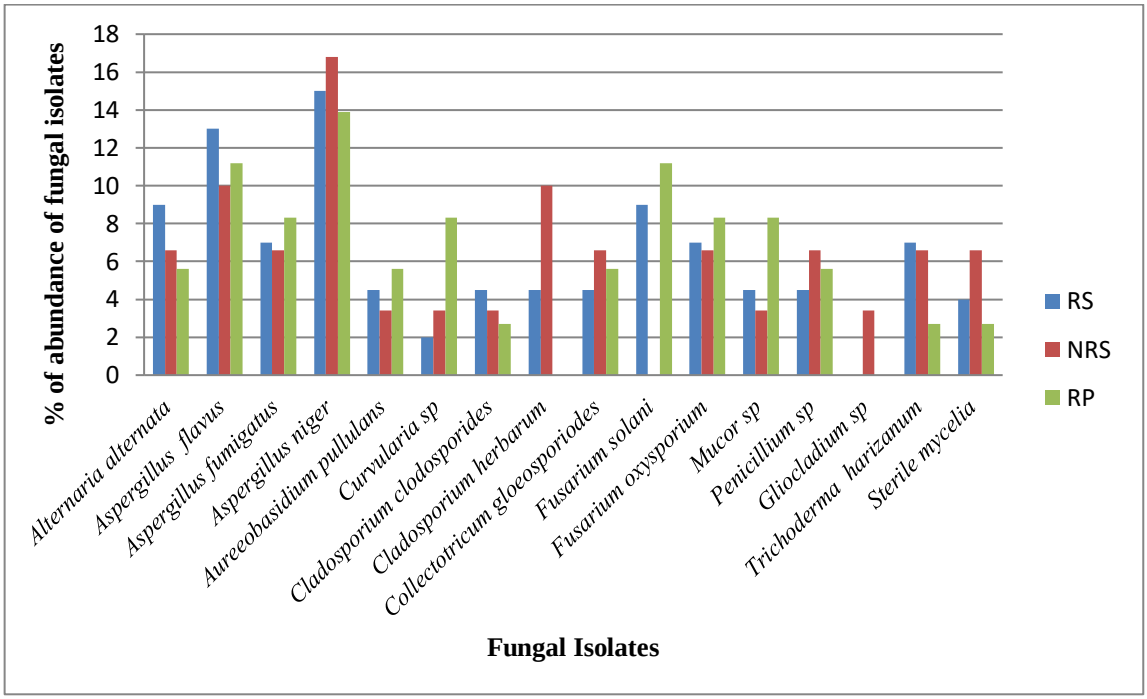
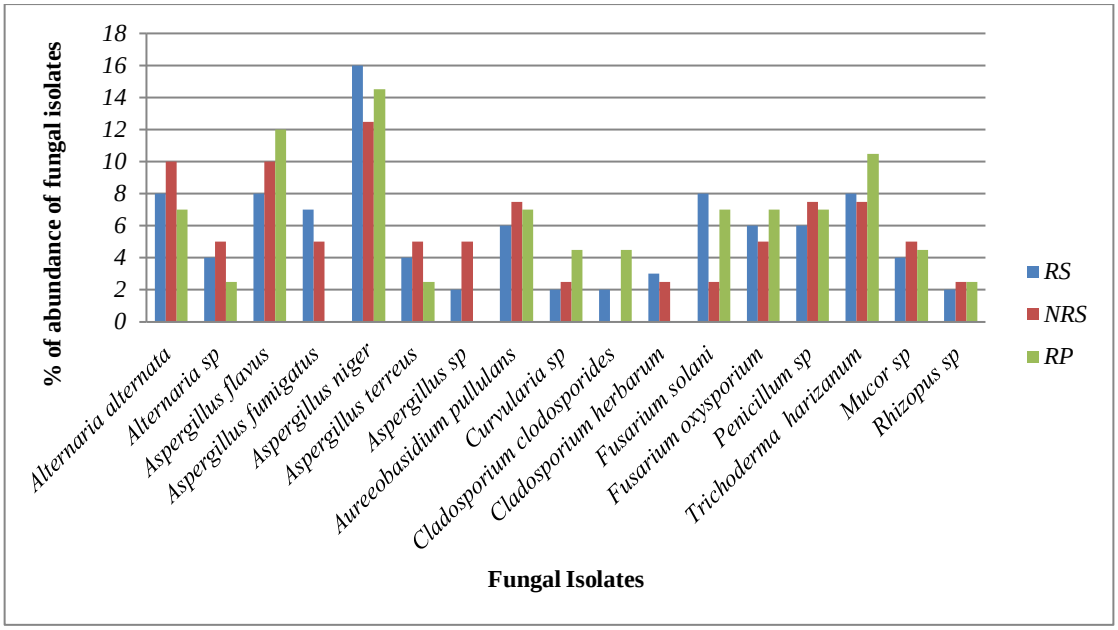


Fig 7: Fungal population density of plantation (*Quercus serrata*) soil in Spring (March-April), 2014.

Table 14: Relative abundance% Fungal isolates of RS, NRS and RP soil of *Quercus serrata* plantation during Autumn season (September-October), 2013 and 2014.

Sl.No.	Fungal isolates	Relative abundance %						Remarks
		2013			2014			
		RS	NRS	RP	RS	NRS	RP	
1	*Alternaria alternata*	8.0	10.0	7.0	7.5	10.5	9.5	
2	*Alternarea* sp	4.0	5.0	2.5	4.0	5.0	2.5	
3	*Aspergillus flavus*	8.0	10.0	12.0	12.0	10.6	14.5	
4	*Aspergillus fumigatus*	7.0	5.0	-	7.5	7.8	7.5	
5	*Aspergillus niger*	16.0	12.5	14.5	16	13.0	16.5	Dominant
6	*Aspergillus terreus*	4.0	5.0	2.5	2.0	2.5	2.5	
7	*Aspergillus* sp	2.0	5.0	-	4.0	5.0	-	
8	*Aureobasidium pullulans*	6.0	7.5	7.0	5.9	5.0	4.5	
9	*Curvularia* sp	2.0	2.5	4.5	4.0	5.0	2.5	
10	*Cladosporium clodosporides*	2.0	-	4.5	2.0	-	4.5	
11	*Cladosporium herbarum*	3.0	2.5	-	2.0	2.5	-	
12	*Fusarium solani*	8.0	2.5	7.0	7.6	2.5	7.5	
13	*Fusarium oxysporium*	6.0	5.0	7.0	5.9	7.8	7.5	
14	*Penicillum* sp	6.0	7.5	7.0	5.8	7.8	4.5	
15	*Trichoderma harizanum*	8.0	7.5	10.5	5.8	5.0	6.5	
16	*Mucor* sp	4.0	5.0	4.5	4.0	2.5	4.5	
17	*Rhizopus* sp	2.0	2.5	2.5	2.0	2.5	2.5	
18	*Sterile mycelia*	4.0	5.0	2.5	2.0	5.0	2.5	

RS: Rhizosphere; NRS: Non Rhizosphere ; RP: Rhizoplane



RS: Rhizosphere; NRS: Non Rhizosphere ; RP: Rhizoplane

Fig 8: Fungal population density of plantation (*Quercus serrata*) soil in Autumn (Sept-Oct), 2013.

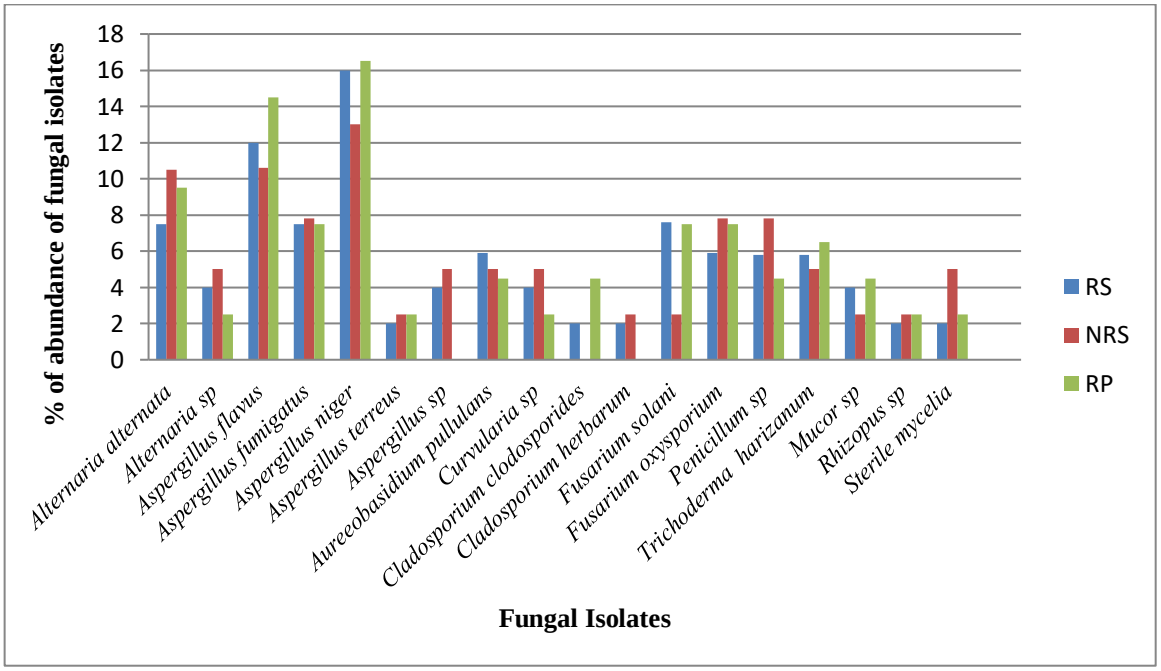


Fig 9: Fungal population density of plantation (*Quercus serrata*) soil in Autumn (Sept-Oct), 2014.

4.4.4. Qualitative and quantitative study of mycoflora of *Quercus serrata* plantation during Spring and Autumn season.

A total eleven fungal species were isolated from air over *Quercus serrata* plantation during Spring and Autumn season during 2013 and 2014 at 0.75 meters at 1.50 meters height(Table:15,16). *Aspergillus flavus, A.fumigatus, A.niger, Alternaria alternata, Cladosporium* sp, *Colletotrichum* sp, *Curvularia* sp *Mucor* sp *Penicillum* sp, Sterile mycelia were found in Spring and Autumn season, in additional *Fusarium* sp found. In autumn season only in 0.75 meters height *Aspergillus* was dominant, followed by *Alternaria*> *Cladosporium*> *Penicillum* autumn season. *Penicillum* sp and *Fusarium* sp were not found in spring season but found in autumn season at 1.50 meters height.

Table 15: Relative abundance% Fungal isolates from air over (*Quercus serrata* Plantation during Spring (March-April) and Autumn season (September-October), 2013 and 2014 at 0.75meter height.

Status of height 0.75 meter	Fungal isolates	Relative abundance%			
		2013		2014	
		March- April	Sept-Oct	March- April	Sept-Oct
	Alternaria alternata	12.0	10.0	12.0	10.00
	Aspergillus flavus	14.0	12.0	12.5	15.5
	Aspergillus niger	20.0	22.0	20.0	20.0
	Aspergillus fumigatus	12.0	10.0	5.0	7.0
	Cladosporium sp	10.0	8.0	8.0	7.0
	Colletotrichum sp	5.0	6.0	5.0	4.0
	Curvularia sp	5.0	6.0	8.0	8.0
	Fusarium sp	0.0	4.0	0.0	3.5
	Mucor sp	8.0	8.0	12.5	7.5
	Penicillum sp	8.0	10.0	9.0	12.0
	Sterile mycelia	6.0	11.0	8.5	5.5

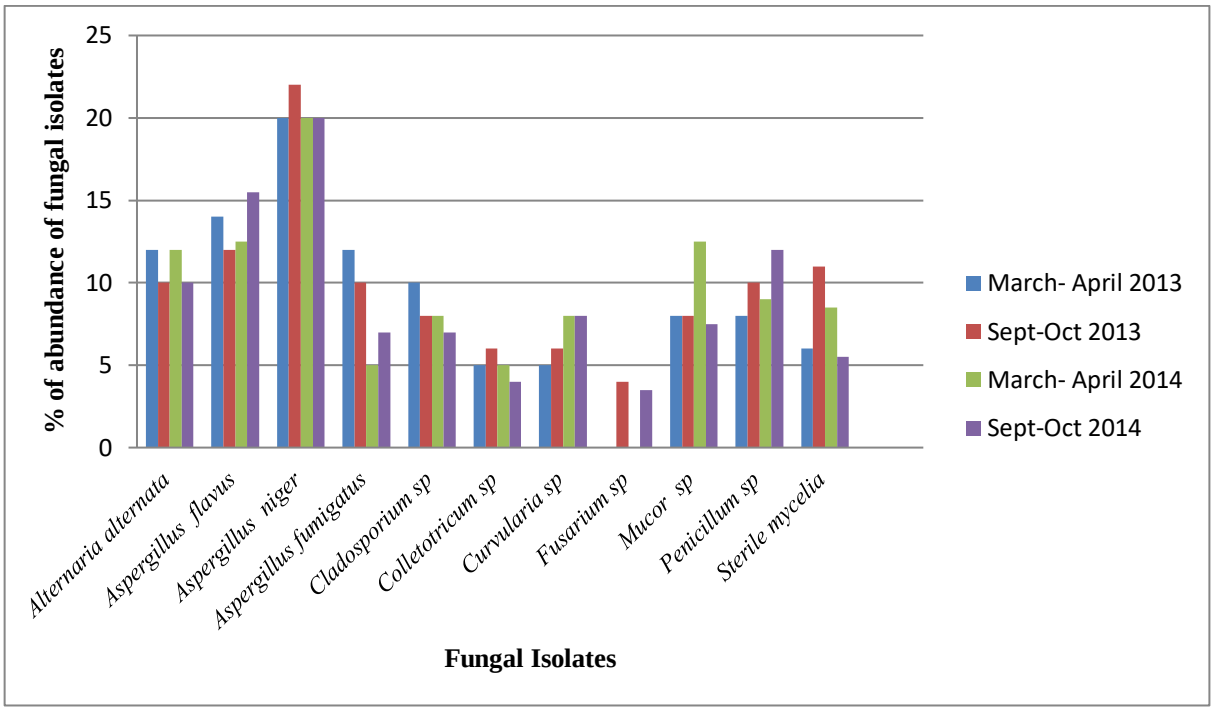


Fig 10: Fungal population density of from air over (*Quercus serrata)* plantation during Spring (March-April) and Autumn season (September-October), 2013 and 2014 at 0.75 meter.

Table 16: Relative abundance% Fungal isolates from air over (*Quercus serrata)* plantation during Spring (March-April) and Autumn season (September-October), 2013 and 2014 at height 1.5 meters.

Status of height meter	Fungal isolates	Relative abundance%			
		2013		2014	
		March- April	Sept-Oct	March- April	Sept-Oct
1.50 meter	*Alternaria alternata*	12.0	10.00	13.0	10.00
	Aspergillus flavus	15.0	14.0	16.0	14.0
	Aspergillus niger	22.0	20.0	24.0	23.0
	Aspergillus fumigatus	8.0	4.0	8.0	4.5
	Cladosporium sp	10.0	8.0	11.0	9.0
	Colletotrichum sp	8.0	8.0	5.5	12.5
	Curvularia sp	8.0	6.0	5.5	4.5
	Fusarium sp	0.0	6.0	0.0	0.0
	Mucor sp	6.0	8.0	5.5	8.0
	Penicillum sp	0.0	10.0	0.0	10.0
	Sterile mycelia	11.0	6.0	11.5	4.5

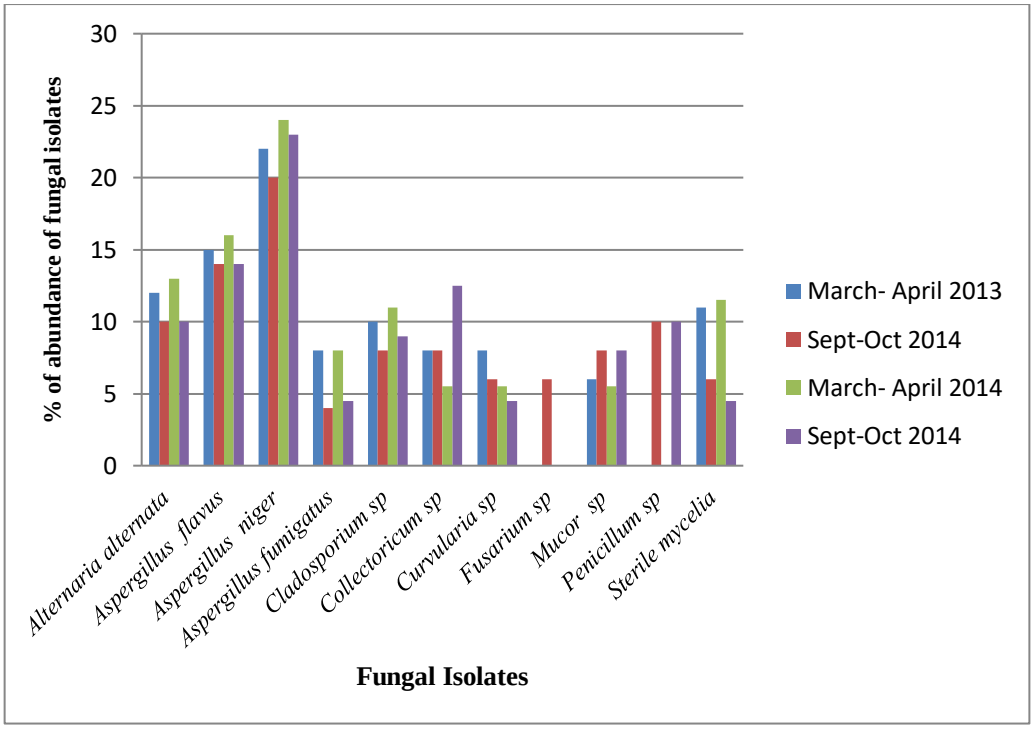


Fig 11: Fungal population density of from air over (*Quercus serrata* plantation during Spring (March- April) and Autumn season (September-October), 2013 and 2014 at 1.5 meters.

4.5 Physico-chemical characters of soil under *Quercus serrata* plantation at R.E.C.Umrangso Farm.

Organic carbon percentage and Nitrogen (ppm) of the soil is more when applied FYM+NPK than control. But Phosphous and Potash (ppm) is more in control where any FYM or NPK not applied.

Analysis of soil from Umrangso Research Extension Centre, farm were conducted (Table:17). In fertilized soil pH 4.51, Organic Carbon 2.23%, average Nitrogen 331.90 ppm, Phosphate 32.00 ppm and Potash 75.00 ppm. But in non fertilized soil pH 4.61, was little higher than fertilized soil Organic Carbon 1.56%, which was laser than fertilized soil availability of Nitrogen 231.14 ppm which was very much less then fertilized soil. Availably of Phosphous was observed slightly more *i.e.* 36.00 ppm but availability of Potash was observed 150.00ppm which was almost double than fertilized soil.

Table 17: Physico-chemical characters of soil under *Quercus serrata* plantation at R.E.C.Umrangso Farm.

SL No.	Particulars	pH	O.C.(%)	Av.N_2 (ppm)	Av.P (ppm)	Av.K (ppm)
1	Fertilizer	4.51	2.23	331.90	32.00	75.00
2	Non- fertilizer	4.61	1.56	231.14	36.00	150.00

4.6 Foliar constituents of Oak leaf *(Quercus serrata)* 2013 and 2014 under different treatments.

4.6.1 Treatment A (Control without application of NPK and FYM):

Foliar constitution of ***Quercus serrata*** where plants were without application of NPK and FYM (Control) in Spring (March-April) and Autumn (September-October) in 2013 and 2014 in Spring season average leaf moisture 60.96%, crude protein 7.185%, Crude Fibre 4.685%, Crude Fat 1.765%, Ash 1.42%, Carbohydrates 6.46% and ERR 31.50%.

In Autumn Season Leaf Moisture 51.10%, Crude Protein 4.10%, Crude Fibre 4.545%, Crude Fat 1.605%, Ash 1.41%, Carbohydrates 14.85% and ERR 16.20% were found.

Table 18: Foliar constituents of Oak leaf (Q*uercus serrata*) 2013 and 2014 plants were treated without FYM and NPK.

Season	Moisture%	Crude protein%	Crude fibre%	Crude fat%	Ash%	Carbohydrates %	ERR%
Spring 2013	61.01	7.20	4.757	1.83	1.44	6.5	31.50
Spring 2014	60.962	7.2	4.70	1.70	1.40	6.431	
Mean	60.96	7.185	4.685	1.765	1.42	6.46	
Autumn 2013	51.10	4.10	4.60	1.61	1.41	14.80	16.20
Autumn 2014	51.10	4.10	4.49	1.60	1.415	14.9	
Mean	51.10	4.10	4.545	1.605	1.41	14.85	

4.6.2 Treatment B: Foliar Constituents application of ***Quercus serrata,*** where plants were with application NPK and FYM in Spring and Autumn Season in 2013 and 2014. Application per plant 48.0gm urea, 46.5gm single super phosphate 9.3gm murate of potash and 10kg FYM.

In the Spring season average leaf moisture 68.98%, Crude Protein 10.28%, Crude Fibre 6.78%, Crude Fat 2.34%, Ash 1.88%, Carbohydrates 10.80% and ERR 64.50% were found, but in Autumn season found less Leaf Moisture 57.23%, Crude Protein 5.13%, a little more Crude Fibre 7.09%, Crude Fat 1.94%, Ash 1.90%, but Carbohydrates more 21.33% almost double than Spring Season ERR 31.65% which was less than Spring Season.

Table 19: Foliar constituents of Oak leaf *(Quercus serrata)* in 2013 and 2014 where plants were applied with FYM and NPK.

Season	Moisture%	Crude protein%	Crude fibre%	Crude fat%	Ash%	Carbohydrates %	ERR%
Spring 2013	68.62	10.27	6.76	2.32	1.88	10.83	64.50
Spring 2014	69.35	10.30	6.80	2.36	1.88	10.78	
Mean	68.98	10.28	6.78	2.34	1.88	10.80	
Autumn 2013	57.20	5.08	7.08	1.95	1.92	21.00	31.65
Autumn 2014	57.27	5.18	7.10	1.93	1.88	21.66	
Mean	57.23	5.13	7.09	1.94	1.90	21.33	

4.6.3. Treatment C : Foliar Constituents application of ***Quercus serrata,*** where plants were with application FYM in Spring and Autumn Season in 2013 and 2014. Application per plant 10kg FYM.

In the Spring season average leaf moisture, Crude Protein, Crude Fibre, Crude Fat, Ash, Carbohydrates, and ERR were recorded 64.14%, 8.10%, 5.18%, 2.09%, 1.64%, 8.26%, and 43.50% respectively in Autumn season found leaf moisture, Crude Protein, Crude Fibre, Crude Fat, Ash, Carbohydrates, and ERR were recorded 54.10%, 4.17%, 5.17%, 1.80%, 1.61%, 18.20%, and 23.85%.

Table 20: Foliar constituents of Oak leaf *(Quercus serrata)* in 2013and 2014 where plants applied with FYM.

Season	Moisture%	Crude protein%	Crude firbe%	Crude fat%	Ash%	Carbohydrates %	ERR%
Spring 2013	61.198	8.09	5.197	2.089	1.638	8.233	43.50
Spring 2014	64.078	8.11	5.159	2.101	1.643	8.285	
Mean	64.14	8.10	5.18	2.09	1.64	8.26	
Autumn 2013	54.088	4.162	5.164	1.809	1.598	18.18	23.85
Autumn 2014	54.115	4.177	5.186	1.789	1.617	18.23	
Mean	54.10	4.17	5.17	1.80	1.61	18.20	

The result of foliar constituents of *Quercus serrata* under different of 2013 and 2014 in Spring and Autumn season (Table;18,19,20). In Spring season more leaf moisture %,crude protein and higher effective rate of recorded but in Autumn season carbohydrates % more and crude protein % and effective rate of rearing was less recorded in all three different treatment of *Quercus serrata* leaves. The better results were recorded in treatment (B) *i.e.*. leaf moisture, crude protein, crude fibre, crudefat, ash, carbohydrates and Effective Rate of Rearing (ERR%) 68.98%,10.28%,6.78%,2.34%,1.88%,10.80% and 64.50% respectively and during Autumn season leaf moisture 57.23%,crude protein 5.13%,crude fibre 7.09%,crude fat 1.94% ash 1.90%,carbohydrates 21.33% and ERR 31.60%.When in *Q.serrata* plants were applied recommended dose FYM and NPK got better quality and quantity leaves and better silk rearing performance.

Table 21: Leaf constituents of *Q.serrata* under different treatments Spring Crop 2013 and Statistical analysis.

Treatment Replication	Moistue(%)			Crude protein			Crude fibre			Crude fat(%)			Ash			Carbohydrate		
	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM
R1	61.1	68.2	64.5	7.35	10.27	8.24	4.85	6.76	5.25	1.85	2.32	2.10	1.45	1.88	1.65	6.50	10.83	8.25
R2	61.15	68.50	64.15	7.2	10.35	8.15	4.8	6.70	5.10	1.80	2.88	2.05	1.42	1.90	1.60	6.45	10.86	8.30
R3	60.80	68.45	64.30	7.25	10.25	7.92	4.82	6.82	5.24	1.82	2.36	2.12	1.40	1.86	1.62	6.50	10.80	8.24
R4	60.85	68.75	64.18	7.28	10.23	8.1	4.88	6.65	5.15	1.86	2.30	2.20	1.43	1.88	1.65	6.48	10.78	8.32
R5	60.80	68.30	63.85	7.10	10.30	7.96	4.75	6.68	5.18	1.82	2.35	2.05	1.45	1.86	1.68	6.45	10.85	8.35
R6	61.20	68.20	64.20	7.12	10.27	7.90	4.72	6.85	5.12	1.80	2.30	2.10	1.48	1.94	1.62	6.54	10.86	8.18
R7	60.75	68.65	64.75	7.15	10.35	8.10	4.68	6.82	5.18	1.88	2.25	2.05	1.40	1.86	1.64	6.50	10.82	8.10
R8	61.30	69.15	64.35	7.20	10.30	8.15	4.65	6.80	5.20	1.84	2.32	2.08	1.45	1.84	1.70	6.60	10.80	8.15
R9	61.25	68.48	64.48	7.25	10.25	8.24	4.70	6.75	5.35	1.80	2.40	2.08	1.46	1.86	1.62	6.35	10.80	8.24
R10	60.90	69.10	63.42	7.10	10.15	8.18	4.72	6.65	5.2	1.82	2.32	2.06	1.48	1.92	1.60	6.48	10.90	8.20
Total	610.10	686.20	641.98	72.00	100.70	80.94	47.57	67.48	51.97	18.29	23.20	20.89	14.42	18.80	16.38	64.85	108.30	82.33
Mean	61.10	68.62	64.19	7.20	10.07	8.09	4.757	6.748	5.197	1.829	2.320	2.089	1.442	1.880	1.638	6.485	10.830	8.233
SED(±)	0.041			0.003			0.003			0.001			0.000			0.002		
CD(5%)	0.072			0.006			0.005			0.001			0.001			0.004		

In Spring season 2013, the leaf Moisture of *Q.serrata* under different treatment SED(±) 0.41 and CD (5%) 0.072 which was not significant. Crude Protein SED(±) 0.003 and CD(5%) 0.006 which was not significant. Crude Fibre SED(±) 0.003 and CD(5%) 0.005, which was not significant. Crude Fat of *Q.serrata* under different treatment SED(±) 0.001 and CD (5%) 0.001, Ash SED(±) 0.000 and CD(5%) 0.001, Carbohydrate SED(±) 0.002 and CD(5%) 0.004 which was not significant among the different treatment.

Table 22: Leaf constituents of *Q.serrata* under different treatments Autumn Crop 2013 and Statistical analysis.

Treatment Replication	Moistue(%)			Crude protein			Crude fibre			Crude fat(%)			Ash			Carbohydrate		
	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM
R1	51.20	57.30	57.20	4.10	5.08	4.15	4.60	7.08	5.1	1.62	1.95	1.82	1.40	1.92	1.60	14.50	21.80	18.50
R2	50.85	57.00	54.10	4.08	5.04	4.20	4.58	7.10	5.16	1.60	1.93	1.78	1.42	1.94	1.62	14.80	21.50	17.80
R3	50.78	57.50	54.24	4.05	5.10	4.12	4.55	7.06	5.08	1.56	1.98	1.80	1.40	1.90	1.58	14.60	20.80	18.20
R4	50.60	57.20	54.30	4.15	5.06	4.18	4.52	7.05	5.14	1.64	1.96	1.85	1.38	1.90	1.56	14.80	21.20	18.00
R5	51.35	57.00	53.85	4.08	5.12	4.16	4.56	7.08	5.10	1.62	1.92	1.84	1.42	1’92	1.54	14.50	21.30	18.40
R6	51.40	56.80	54.20	4.06	5.06	4.08	4.48	7.12	5.18	1.56	1.94	1.78	1.42	1.90	1.60	15.00	21.20	18.00
R7	51..30	57.20	53.80	4.10	5.10	4.25	4.52	7.10	5.20	1.64	1.90	1.84	1.44	1.96	1.64	15.20	20.60	18.30
R8	51.40	57.50	53.75	4.05	5.04	4.14	4.58	7.12	5.24	1.60	1.98	1.76	1.40	1.94	1.62	14.80	20.80	18.60
R9	50.80	56.80	54.25	4.12	5.08	4.16	4.64	7.08	5.20	1.60	1.94	1.80	1.38	1.92	1.58	15.00	21.20	17.80
R10	51.30	57.70	54.15	4.08	5.12	4.18	4.60	7.01	5.24	1.64	2.0	1.82	1.40	1.90	1.64	14.50	20.40	1`8.20
Total	510.98	572.00	540.88	40.87	50.80	41.62	45.63	70.80	51.64	16.10	19.50	18.09	14.060	19.20	15.98	14.77	210.00	181.80
Mean	51.098	57.20	54.088	4.087	5.080	4.162	4.56	7.08	5.164	1.61	1.95	1.809	1.406	1.92	1.598	1.477	21.00	18.18
SED(±)	0.040			0.005			0.001			0.000			0.00017			0.048		
CD(5%)	0.069			0.0008			0.002			0.001			0.00030			0.089		

In Autumn season 2013,Leaf Moisture of *Q.serrata* under different treatment SED(±) 0.040 and CD (5%) 0.069, Crude Protein SED(±) 0.005 and CD(5%) 0.0008, Crude Fibre SED(±) 0.001 and CD(5%) 0.002 which were not significant among the different treatments. Crude Fat of *Q.serrata* under different treatment SED(±) 0.000 and CD (5%) 0.001, Ash SED(±) 0.00017 and CD(5%) 0.00030, Carbohydrate SED(±) 0.048 and CD(5%) 0.089 which were not significant among the different treatment.

Table 23: Leaf constituents of *Q.serrata* under different treatments Spring Crop 2014 and Statistical analysis.

Treatment Replication	Moistue(%)			Crude protein			Crude fibre			Crude fat(%)			Ash			Carbohydrate		
	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM
R1	61.25	69.40	63.50	7.25	10.35	8.14	4.75	6.85	5.15	1.65	2.38	2.15	1.48	1.89	1.58	6.80	10.76	8.35
R2	61.12	69.30	64.25	7.15	10.25	8.25	4.60	6.80	5.12	1.70	2.34	2.08	1.45	1.87	1.70	6.40	10.80	8.30
R3	60.50	69.25	64.30	7.20	10.30	7.90	4.72	6.75	5.25	1.62	2.36	2.10	1.42	1.85	1.64	6.35	10.74	8.45
R4	60.55	69.45	64.28	7.18	10.25	8.15	4.68	6.70	5.10	1.76	2.34	2.18	1.25	1.88	1.65	6.28	10.82	8.30
R5	60.70	69.30	63.65	7.15	10.35	7.95	4.65	6.85	5.15	1.62	2.40	2.15	1.35	1.86	1.62	6.25	10.72	8.35
R6	61.25	69.40	64.30	7.14	10.40	7.92	4.70	6.90	5.10	1.70	2.35	2.10	1.38	1.85	1.68	6.50	1o.80	8.20
R7	60.35	69.20	64.55	7.18	1O.20	8.15	4.62	6.80	5.14	1.68	2.35	2.06	1.45	1.89	1.64	6.70	10.74	8.15
R8	61.30	69.50	64.25	7.12	10.25	8.25	4.68	6.75	5.25	1.64	2.36	2.08	1.42	1.84	1.66	6.40	1o.82	8.20
R9	61.20	69.30	64.38	7.20	10.35	8.20	4.71	6.85	5.15	1.75	2.35	2.05	1.36	1.90	1.62	6.25	1o.78	8.25
R10	60.8	69.40	63.32	7.15	10.30	8.15	4.73	6.75	5.18	1.80	2.37	2.06	1.40	1.87	1.64	6.38	10.82	8.30
Total	609.02	693.50	640.78	71.72	103.00	81.060	46.84	68.00	51.590	16.92	23.60	21.010	13.960	18.70	16.430	64.310	107.80	82.850
Mean	60.902	69.35	64.078	7.172	10.30	8.106	4.684	6.80	5.159	1.692	2.360	2.101	1.396	1.87	1.643	6.431	10.78	8.285
SED(±)	0.050			0.004			0.001			0.001			0.001			0.008		
CD(5%)	0.086			0.007			0.002			0.002			0.002			0.0013		

Leaf Moisture of *Q.serrata* under different treatment SED(±) 0.050 and CD (5%) 0.086, Crude Protein SED(±) 0.004 and CD(5%) 0.007, Crude Fibre SED(±) 0.001 and CD(5%) 0.002 which were not significant. Crude Fat of *Q.serrata* under different treatment SED(±) 0.001 and CD (5%) 0.002, Ash SED(±) 0.001 and CD(5%) 0.002, Carbohydrate SED(±) 0.008 and CD(5%) 0.0013 which were not significant among the different treatment.

Table 24:Leaf constituents of *Q.serrata* under different treatments Autumn Crop 2014 and Statistical analysis.

Treatment Replication	Moistue(%)			Crude protein			Crude fibre			Crude fat(%)			Ash			Carbohydrate		
	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM
R1	51.35	57.30	54.15	4.15	5.20	4.25	4.50	7.10	5.15	1.64	1.93	1.72	1.45	1.90	1.65	14.80	21.68	18.80
R2	50.65	57.25	54.10	4.18	5.16	4.20	4.68	7.14	5.20	1.62	1`.91	1.75	1.40	1.84	1.60	14.60	21.60	18.00
R3	50.48	57.20	54.25	4.02	5.18	4.18	4.45	7.08	5.10	1.50	1.96	1.80	1.42	1.90	1.58	14.50	22.10	18.20
R4	50.65	57.25	54.30	4.05	5.15	4.15	4.62	7.06	5.15	1.65	1.88	1.86	1.35	1.92	1.60	14.80	21.60	18.50
R5	51.15	57.20	53.65	4.12	5.20	4.25	4.46	7.12	5.16	1.52	1.92	1.82	1.32	1.88	1.64	14.60	21.70	18.40
R6	51.45	57.20	54.20	4.08	5.22	4.08	4.40	7.08	5.10	1.56	1.94	1.78	1.45	1.86	1.67	15.20	21.75	18.20
R7	51.36	57.30	53.85	4.10	5.16	4.15	4.32	7.14	5.20	1.54	1.91	1.80	1.48	1.84	1.64	15.40	21.60	18.50
R8	51.45	57.26	54.10	4.08	5.14	4.20	4.28	7.06	5.25	1.65	1.93	1.74	1.46	1.85	1.62	14.80	21.67	18.40
R9	50.60	57.10	54.35	4.06	5.24	4.16	4.54	7.10	5.30	1.62	1.94	1.82	1.36	1.87	1.60	15.40	21.20	17.80
R10	51.50	57.64	54.20	4.08	5.15	4.15	4.62	7.12	5.25	`1.64	1.98	1.80	1.46	1.94	1.62	14.80	21.80	17.50
Total	510.64	572.70	541.150	40.920	51.80	41.77	44.87	71.00	51.860	15.94	19.30	17.890	14.150	18.80	16.170	148.90	216.70	182.30
Mean	51.064	57.27	54.115	4.092	5.18	4.177	4.487	7.10	5.186	1.594	1.930	1.789	1.415	1.88	1.617	14.89	21.67	18.23
SED(±)	0.036			0.0007			0.003			0.001			0.00071			0.052		
CD(5%)	0.063			0.0013			0.005			0.002			0.00123			0.090		

In Autumn season 2013,leaf Moisture of *Q.serrata* under different treatment SED(±) 0.036 and CD (5%) 0.063, Crude Protein SED(±) 0.0007 and CD(5%) 0.0013, Crude Fibre SED(±) 0.003 and CD(5%) 0.005 which were not significant among the different treatments. Crude Fat of *Q.serrata* under different treatment SED(±) 0.001 and CD (5%) 0.002, Ash SED(±) 0.00071 and CD(5%) 0.00123, Carbohydrate SED(±) 0.052 and CD(5%) 0.090 which were not significant among the different treatment.

4.7 The reeling parameter of *A.proylei* **Jolly.** cocoons were taken from three different treatments

A.Cocoons, harvested from the rearing where FYM and NPK not applied in Oak plants.

B.Cocoons, harvested from the rearing where applied FYM and NPK in Oak plants.

C.Cocoons harvested from the rearing where Oak plants were applied FYM only.

Average Filament length 588.92 m, Denier 6.288, Non Breakable Filament Length (NBFL) 298.60 m, Silk recovery 62.20% and Reelability 41.14% were observed from the treatment (A) cocoons. Similarly, cocoons from treatment (B) average Filament length were 662.030 m, Denier 6.148, NBFL 330.40 m, Silk recovery 70.15% and Reelability 46.27%. From cocoons treatment(C) average filament length 627.14 m, Denier 6.225, NBFL 314.30m,Silk recovery 65.130% and Reelability 43.20%. Hence reeling parameter comparative better from the treatments like this B>C>A.

Table 25:Reeling Parameter of *A.proylei* Jolly.cocoon

Filament Treatment	Average Filament length	Denier	NBFL in metres	Recovery %	Reelability %
A	585.92	6.288	298.6	62.20	41.14
B	662.30	6.148	330.4	70.15	46.27
C	627.14	6.225	314.3	65.13	43.20

Photo plate No:**11(a)**: Showing Reeling and **11(b)** Spinng machine, **11(c)**Preparation of Ghicha, **11(d)** Weaving loom, **12 (a)** Reeled yarn **12 (b)** Spun yarn, **12 (c)** Ghicha yarn, **12(d)** Different types oak tasar silk yarns, **13(a)** Oak tasar saree **13(b)** Fabrics (waistcoat, bag and coat)

Table 26: Reeling parameter of *A.proylei* cocoons under different treatments with Statistical analysis.

Treatment Replication	Filament length in meters			Deniar			NBFL			Silk recovery(%)			Reelability (%)		
	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM	Control	NPK+ FYM	FYM Control
R1	590.80	670.50	640.50	6.36	6.05	6.20	298	338	308	62.6	70.5	65.2	41.4	46.5	43.2
R2	590.6	660.80	625.60	6.30	6.18	6.14	306	330	315	62.2	70.2	65.6	41.2	46.2	43.5
R3	565.2	665.60	610’50	6.45	6.12	6.16	292	336	312	62.5	70.8	66.2	40.8	46.6	43.8
R4	595.5	658..80	618.20	6.25	6.24	6.25	296	324	318	62.6	70.2	64.8	40.6	46.4	43.6
R5	580.8	648.20	622.50	6.28	6.15	6.32	303	328	306	62.2	70.6	65.6	40.5	46.8	43.4
R6	588.5	668.40	630.20	6.32	6.10	6.28	301	340	310	62.8	71.2	64.5	41.5	46.2	43.2
R7	605.3	662.50	632.50	6.20	6.12	6.25	296	328	315	61.8	71.5	65.4	41.2	46.4	43.5
R8	570.2	668.80	635.20	6.24	6.20	6.20	294	320	320	61.5	68.8	65.2	41.4	45.8	42.8
R9	596.8	662.50	630.80	6.30	6.14	6.18	298	335	324	61.6	68.5	64.6	41.6	45.6	42.6
R10	575.5	654.20	625.40	6.18	6.18	6.27	302	325	315	62.2	69.2	64.2	41.2	46.2	42.4
Total	5859.20	6620.30	6271.40	62.88	61.48	62.250	2986	3304	3143	622.0	701.50	651.30	411.4	462.70	432.0
Mean	585.92	662.30	627.14	6.288	6.148	6.225	298.6	330.4	314.3	62.20	70.15	65.13	41.14	46.27	43.20
SED(±)	32.002			0.003			16.178			0.158			0.086		
CD(5%)	55.491			0.004			28.988			0.274			0.149		

The filament length SED(±) 32.002 and CD at 5% (55.492) under different treatment which was highly significant. The Deniar SED(±) 0.003 and CD at 5% (0.004) was found not significant. The NBFL SED(±) 16.178 and CD at 5% (28.988 which was highly significant. Silk recovery % SED(±) 0.158 and CD at 5% (0.274%) which was not significant. Reelability % SED(±) 0.086 and CD at 5% (0.149) which was not significant.