

## A QUALITATIVE STUDY OF PLANTATIONS FOR THEIR QUANTITATIVE RANKING

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### Introduction

Every year block plantations are being done in forest areas and outside all across the country. However, the quality of those plantations are mainly being judged subjectively by considering only a few factors that are in immediate priority of inspecting authority. Out of this, the better look of plantations foliage-wise quite often becomes deciding factor for a good plantation in field. Though the plantation journals are there for each plantation to record step by step efforts taken, mostly, the comments of inspecting authority depend on his ocular estimate of plantation with only a few factors in consideration.

During the course of monitoring and evaluating the activities of West-Bengal Forestry Project in North-Bengal, to adjudge the quality of plantations as per project prescriptions was one of the activities to be undertaken by the Monitoring Wing. Initially, it was decided to do sampling of each plantation, to measure the girth and height of seedlings in random samples, to assess the survival percentage of plantation, to note the deviation, if any, with project prescriptions etc. The remarks on plantations were normally written by field staff of monitoring, the Gazetted Assistant and sometimes also by the Deputy Conservator of Forests for his own assessment of plantation depending on ocular estimates. However, the said report

ended with mere calculation of survival per cent in plantation along with subjective comments on quality.

As experience adds to learning, in subsequent years, parameters were redefined to help quantify the comments depending on different stages involved with plantations. The effort paid dividends. The Plantation Quality Indexing to a plantation done on different successive parameters, as taken, to assess its quality were found to be more objective an approach to read not only the status of plantation but also the degree of efforts put in the plantation by the executing agency.

A brief discussion on the objectives, methodology and kind of revelations are detailed below.

### Objectives

The plantations are supposed to be done on the basis of known silvicultural techniques being suitable for an area. However, the quality of these plantations depends strictly on the alertness of executing agency and its consideration and priority for different criteria that later determine the quality, the success or failure of created plantations.

The evaluation also of these plantations mostly depend on the technical knowledge of assessing authority and quite often it

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ends with a brief felicitation or snubbing of the authority in charge. The process as stated mostly suffers due to personal likings, bias, whims and of course to the spectrum of individual's knowledge and priorities that too which remains current in his mind.

It is, therefore, always better and appropriate to evaluate plantations on the basis of pre-decided parameters and then to assess for known indicators quantitatively that shall add an objectivity to approach and make one to assess impartially. This effort will not only help in reducing uncertainty and subjectivity in assessment but shall also improve the quality of future plantations in field and assess the alertness, innovativeness and future visualisation of the officer being assessed.

In the case of North-Bengal, where plantations were undertaken in different structured models by keeping in view the site requirement and with provisions of intercropping in between lines, the following information in stages were asked to be collected for each plantation, being created during the year 1996, to suitably rank them in fields as follows :-

1. The site suitability of plantation.
2. The source of seed.
3. The quality of planting material used.
4. The selection of species and spacing as per prescription in different models.
5. The status of advance soil work before the plantation.
6. The time of planting.
7. The suitability of cleaning and

mulching in the plantation.

8. The status of intercropping in plantation.
9. The status of grazing in plantation.
10. The count of seedlings in different height-classes for each species, in randomly selected plots determined with statistical table, either sown or planted.
11. The requirement of insecticides and pesticides and that whether its application is done in field.
12. To ascertain whether there were advance growth in plantation and that whether they were removed or maintained later.

The above criteria with slight variation depending on conditions and requirements in other parts of the country can easily be used to assess the quality of plantations.

### **Methodology**

The entire information was collected in a structured format drawn by DCF Monitoring (N) and approved by CF Monitoring and Evaluation, Calcutta. Also a Plantation Quality Indexing chart (Table 1) was prepared to evaluate the plantation.

It was decided and accordingly directed to Range Officers concerned to collect information from records of plantation journals, nursery journals etc. and also through ocular observation of nursery, plantation site and plantation for items from 1 to 9, 11 and 12. The marking were asked to be done with comments for each of

**Table 1**  
*Plantation Quality Indexing Chart*

Sr. No.	Quality criteria for plantation	Marks	Marking
1.	Site suitability of plantation for used Model	10	x1
2.	Source of seeds used for plantation	10	x2
3.	Quality of planting nursery used for plantation	10	x3
4.	Selection of species and spacing as per prescription	10	x4
5.	Advance soil work and its timing	5	x5
6.	Time of planting	10	x6
7.	Suitability of cleaning and mulching in plantation	10	x7
8.	Status of intercropping in plantation created	5	x8
9.	Status of grazing in plantation	10	x9
10.	Weighted average survival percentage	10	x10
11.	Requirement of insecticide, pesticide and it's application	5	x11
12.	Status of advance growth in plantation created	5	x12
Grand Total		100	$\Sigma xi$
Observed Plantation Quality Index on 10 marks			$\Sigma xi/100$

the items by concerned Range Officers, Monitoring Range, to determine the Indexing of plantation. In case of item 10; monitoring report by counting seedlings in different height classes for different species in randomly laid down samples of size 50m x 50m for 10% of the total area was undertaken. The Additional Divisional Forest Officer and the DCF, Monitoring made the test checks for information so collected.

Later, through a computerised programme, the data was analysed in respect of Average-Height, Survival % of species, Standard Deviation, Analysis of Covariance etc. These deductions were utilised to arrive at a correct marking for weighted average of survival per cent of each plantation for item 10.

The marks as given against each criteria selected were rechecked with attached comments and were corrected

where ever required. The sum total was later divided with total marks i.e. 100 to arrive at Plantation Quality Index (PQI).

The Observed PQI for each plantation was also multiplied with corresponding area of plantation and then sum was divided with sum of area of plantation to arrive at weighted average of PQI for each range and then for division. The survival per cent of sowing and stump planting of Teak and the survival per cent of other miscellaneous seedlings were also shown for each plantation. It is found that each Range and Division is ranked for its effort put in plantation and is easily graded. The PQI also helped arrive at status of plantation in field.

### Results

The results as arrived in case of the nine Divisions in North-Bengal are found to be correctly grading the efforts put in

Fig. 1(A)

**Buxa Tiger Reserve(W), 1996**

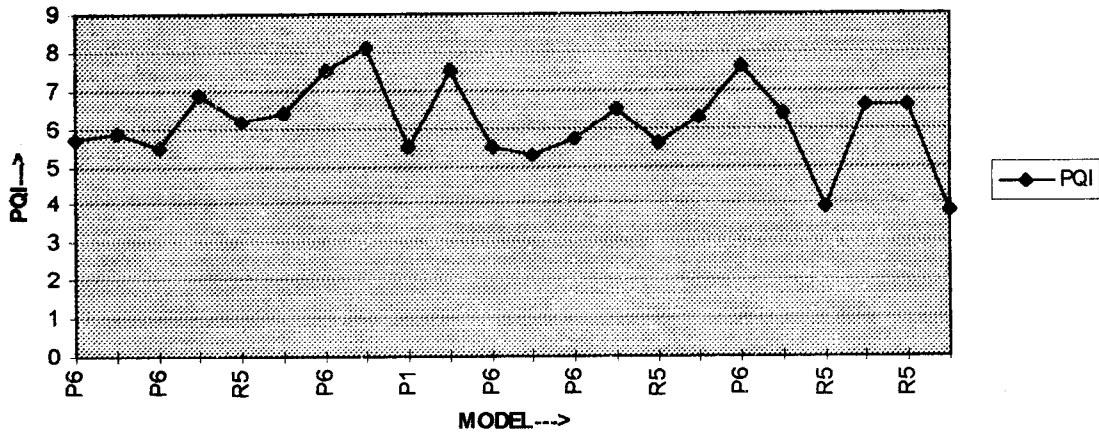
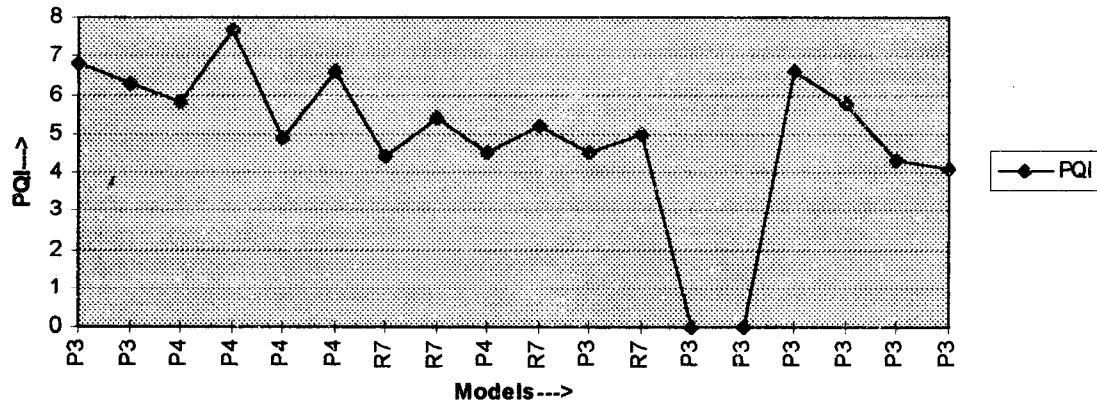


Fig. 1(B)

**"Cooch Bihar (SF) Division, 1996**



plantation and the status of plantation in field. A sample copy of tabulated result for divisions e.g. BTR(W), COBSF, COB are given in Table 2.

The graph of PQI with models along x-axis for a division and the graph of PQI of one model for all the Divisions respectively show the efforts put in by a Division in

Fig. 2(A)  
"Cooch Bihar Forest Division, 1996"

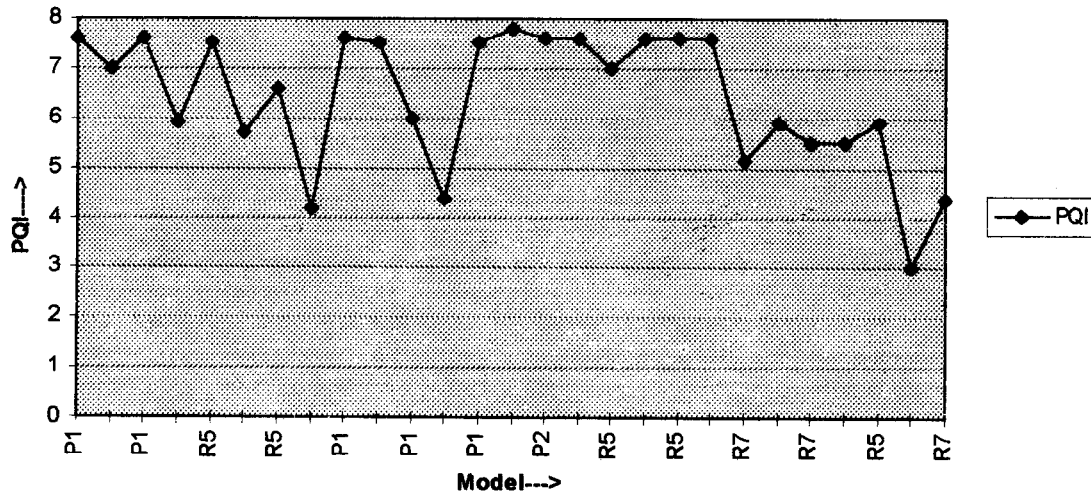
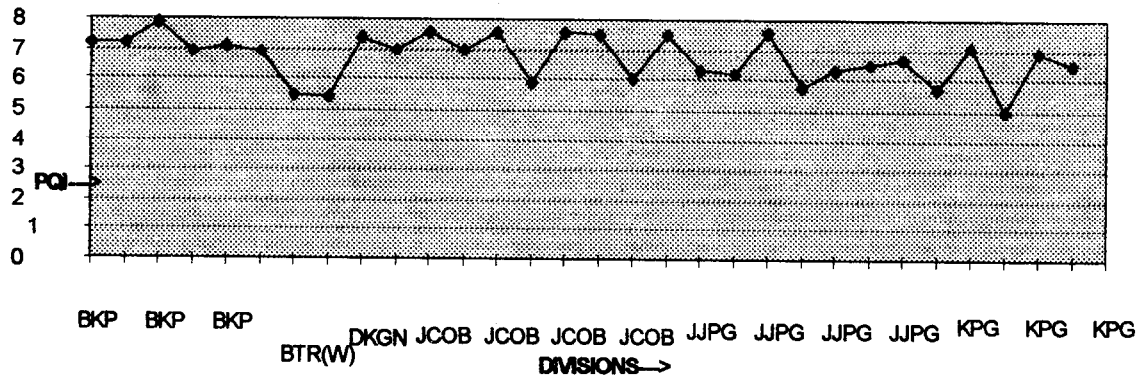


Fig. 2(B)  
"PERFORMANCE OF MODEL P1 WITH DIFFERENT PLANTATION SITES"



raising plantation in a particular model and the fairness of a model to various sites with varying edaphic factors (Fig. 1A and B; Fig. 2A and B). In addition, the efforts put in by each Range and Division are also being quantified and evaluated with accuracy.

**Conclusion**

The methodology can be used with pre-decided parameters for plantations raised anywhere in the country with a lot of objectivity in evaluation and in monitoring the plantation step by step.

Table 2

Range	Beat	Blocmptt	Area (ha)	Model	PQI	S/ST MP (%)	Misc P (%)	Status	Wav- G	Range R
1	2	3	4	5	6	7	8	9	10	11
Buxa Tiger Reserve (W) "Rating Pltn" : 6.2, year : 1996										
E. Damanpur	Gadadhar	Gadadhar-4	7.65	P6	5.7	0	50	M	43.605	
E. Damanpur	Damanpur	Damanpur-8	12	P6	5.9	0	73	M	70.8	
E. Damanpur	Checko	Checko-8	12.48	P6	5.5	0	47	M	68.64	5.7
E. RVK	S. Panbari	Panbari-10	8	P1	6.9	35	37	M	55.2	
E. RVK	S. Panbari	Panbari-10	5.3	R5	6.2	0	41	M	32.86	
E. RVK	N. Panbari	Panbari-5	6.7	R5	6.4	0	59	M	42.88	6.5
Hamiltongunj	Gudamdabri	GDB-3(b),2	12.52	P6	7.5	0	81	G	93.9	
Hamiltongunj	Gudamdabri	GDB-3(b)	9.48	P6	8.1	0	86	G	76.788	7.8
Nimati	East Nimati	Nimati-5	7	P1	5.5	20	40	M	38.5	
Nimati	West Nimati	Nimati-1	15	P6	7.5	0	77	G	112.5	
Nimati	East Nimati	Nimati-4	14	P6	5.5	0	46	M	77	
Nimati	West Poro	Poro-11	15	R5	5.3	0	22	B	79.5	6
Pana	Adma	Adma-3	5	P6	5.7	0	30	M	28.5	
Pana	Pana	Pana-4	10.4	R5	6.5	0	63	M	67.6	
Pana	Gangutia	Raimatang	14.6	R5	5.6	0	46	M	81.76	
Pana	Raimatang	Raimatang-1	15	R5	6.3	0	58	M	94.5	6.1
W. Damanpur	Poro(E)	Poro-10	28.35	P6	7.6	0	73	G	215.46	
W. Damanpur	West Garam	Poro-9	8	P6	6.4	0	68	M	51.2	
W. Damanpur	West Garam	Poro-9	6	R5	3.9	0	33	N	23.4	
W. Damanpur	East Garam	Damanpur-9	4	R5	6.6	0	33	M	26.4	
W. Damanpur	East Garam	Damanpur-6	10	R5	6.6	0	35	M	66	6.8
W. RVK	W. Rajabhatk Hawa	SRVK-9	18.5	P6	3.8	0	26	N	70.3	3.8

Weighted Average of PQI:

Total Area of Plantation Monitored

Rating Plantations:

Cooch Bihar (SF) "Rating Pltn": 4.9 Year: 1996"

Cooch Behar	Nagurhat	Barasalbari	10	P3	6.8	0	70	M	68
Cooch Behar	Atiamochar	Takuamari	10	P3	6.3	0	44	M	63
Cooch Behar	Atiamochar	Takuamari	7.5	P4	5.8	***	51	M	43.5
Cooch Behar	Nagurhat	Rasikbill	15	P4	7.7	***	71	G	115.5
Cooch Behar	Atiamochar	Khagribari	5	P4	4.9		54	B	24.5
Cooch Behar	Atiamochar	Atiamochar	7.5	P4	6.6	***	57	M	49.5
Cooch Behar	Nagurhat	Barasalbari	10	R7	4.42	***	32	B	44.2

(Contd...)

1	2	3	4	5	6	7	8	9	10	11
Cooch Behar	Atiamochar	Atiamochar	10	R7	5.4	***	40	B	54	6.2
Mathabanga	Jamalda	Saruhati	30	P4	4.5	***	41	B	135	
Mathababga	Mathabanga	Baraibari	10	R7	5.2	***	28	B	52	4.7
Mekhliganj	Chengrabandha	Mekhliganj	70	P3	4.5	0	44	B	315	
Mekhliganj	Chengrabandha	Bagherchar	70	R7	5	***	19	B	350	4.8
Pundibari	Patlakhawa	Putimari	6.5	P3	0	0	0	N	0	
		B. Bus								
Punibari	Patlakhawa	Singmari	5.5	P3	0	0	0	N	0	
		P. Par								
Pundibari	Gossanimari	Kajlikura	10	P3	6.6	***	6.6	M	66	
Pundibari	Patlakhawa	Chhatsingimari	5	P3	5.79	0	59	M	28.95	
Pundibari	Patlakhawa	Chhatsingimari	13	P3	4.32	2	30	B	56.16	
Pundibari	Patlakhawa	Putimari	10	P3	4.1	***	17	B	41	3.8
		B. Bus								
									Weighted Average of PQI	4.9
Total Area of Plantation Monitored:									Rating Plantations:	4.9

## Cooch Bihar "Rating Pltn":6.5 Year:1996

Chilapata	Bania	B.N.-5	5.66	P1	7.6	37	78	G	43.016	
Chilapata	Mendabari	M.B-2	12	P1	7	44	48	M	84	
Chilapata	Bania	BN-6	15.61	P1	7.6	48	56	G	118.63	
									6	
Chilapata	Mendabari	MB-3	9.45	P1	5.9	0	52	M	55.755	
Chilapata	Bania	BN-4	5	R5	7.5	0	66	G	37.5	
Chilapata	Bania	BN-5	7	R5	5.7	0	63	M	39.9	
Chilapata	Chilapata	CP-3	8	R5	6.6	5	76	M	52.8	
Chilapata	Chilapata	CP-3	10	P3	4.2	0	27	B	42	6.5
Kodalbasti	Mantharam	MB-1	3.32	P1	7.6	46	62	G	25.232	
Kodalbasti	Kodalbasti	BD-6	5.7	P1	7.5	74	58	G	42.75	
Kodalbasti	Mantharam	BD-4	5.26	P1	6	32	58	M	31.56	7
Lankapara	Hallapara	TITI-4	10	P3	4.4	11	32	B	44	4.4
Madarihat	Dhumchi	Dhumchi-2	3	P1	7.5	81	47	G	22.5	
Madarihat	N. Khairbani	K.B-2	15.2	P2	7.8	87	87	G	118.56	
Madarihat	N. Khairbani	K.B-1	4.8	P2	7.6	86	104	G	36.48	
Madarihat	S. Khairbari	K.B-2	20	P2	7.6	89	89	G	152	
Madarihat	Dhumchi	Dhumchi-2	10	R5	7	85	59	M	70	
Madarihat	S. Khairbari	K.B-2	5	R5	7.6	11	60	G	38	
Madarihat	S. Khairbari	K.B-2	5	R5	7.6	149	56	G	38	
Madarihat	N. Khairbari	KB-2	10	R5	7.6	179	52	G	76	

(Contd...)

1	2	3	4	5	6	7	8	9	10	11
Madarihat	Dhumchi	Dhumchi-2	10	R7	5.16	330	34	B	51.6	
Madarihat	Dhumchi	Dhumchi-2	10	R7	5.9	0	60	M	59	
Madarihat	Dhumchi	DH-1	10	R7	5.5	361	18	M	55	7
Nilpara	Dalsingpara	Jaygaon-2	10	P2	5.5	40	90	M	55	
Nilpara	Nilpara	Dalsingpara-3	7.7	R5	5.9	0	59	M	45.43	
Nilpara	Nilpara	Hasimara-2	2.3	R5	3	0	9	N	6.9	
Nilpara	Dalsingpara	Jaygaon-2	10	R7	4.4	0	20	B	44	5
								Weighted Average of PQI	6.5	
Total Area of Plantation Monitored:								Rating Plantations :	6.5	

Acronyms used:	1. Area-ha:	Total area of Plantation in ha.
	2. PQI:	Plantation Quality Index as per criteria fixed.
	3. %S/STMP:	Percentage of stump planting in model P2 and showing for all other model.
	4. %Misc-P:	Percentage planting of potted seedlings.
	5. RANGE-R:	Plantation rating range-wise.
	6. WAV-G	Weighted average of PQI with area of the plantation.

### SUMMARY

To evaluate the plantations for rank, grade and status, quality criteria were selected, implementing Plantation Quality Index (PQI), using models. This methodology can be used with pre-decided parameters for plantations.

### मात्रात्मक पद-निर्धारण के लिए रोपवनों का गुणात्मक अध्ययन

आर०आर० पाण्डे

#### सारांश

पद, अनुक्रम और स्थिति जानने को रोपवनों का मूल्यांकन करने में गुणात्मक कसैटियों का चुनाव किया गया तथा मॉडल बनाकर रोपवन गुणवत्ता निर्देशांक [PQI] क्रियान्वित किए गए। इस रीति विज्ञान को रोपवनों के पूर्व निश्चित किए गए परिमाणों के साथ उपयोग किया जा सकता है।