GOVERNMENT OF MEGHALAYA

MANUAL ON

CROP ESTIMATION SURVEY
(CROP CUTTING EXPERIMENT)

February, 2017

Directorate of Economics & Statistics
Meghalaya, Shillong

Prepage

The Manual on Crop Estimation Survey – 2016 *has been compiled for use in the Crop Cutting Experiment of different crops conducted by the Directorate of Economics & Statistics, Shillong. At the moment, the methodology developed by the Indian Agricultural Research Institute, PUSA, New Delhi, is used for the survey.*

Along with the methodology, all other formats/schedules, calendars, tables, formula etc. which are required for CCE at different level/stages have been included in this Handbook. The methodology for estimation of area and production of fruits, vegetables and orchard (though no CCE has been conducted yet) also have been included in this Handbook.

The Directorate of Economics & Statistics, Shillong, has been conducting the Crop Cutting Experiment on different crops since the inception of the State on 21st January 1972. In fact, this work has been inherited from the Government of Assam after attaining the full fledged Statehood.

This Handbook is expected to give clear insight on the terms, concepts, procedures, importance of conducting the CCE etc. to the users of this Handbook. This will improve the quality of data collection which is the core objective of this publication.

I would like to complement and thank Shri B. G. Momin, R.O. who has compiled this Manual on Crop Estimation Survey.

Comments and suggestion from the users of this publication for improvement of its quality and usefulness will be highly appreciated.

D.L. Wankhar, IES
Director

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Conversion Table

Weights:

1	Grain	=	0.065	Grams
1	Gram	=	0.035270	Ounces
		=	0.085735	Totas
1	Ounce	=	28.350	Grams
1	Pound	=	0.4536	Kilograms
1	Quintal	=	100	Kilograms
1	Tonne	=	10	Quintals
		=	0.98420	Tons
1	Ton	=	1.01605	Tones
		=	10.16053	Quintals
1	Qwt	=	50.802	Kilograms

LENGTH:

1	Centimeter	=	0.393701	inches
1	Inch	=	25.4	Millimetres
		=	0.0254	Metres
1	Foot	=	0.3048	Metres
		=	3048	Centimetres
1	Metre	=	1.09361	Yards
1	Yard	=	0.9144	Metres
1	Mile	=	1.609344	Kilometres
1	Kilometres	=	0.62137	Miles

Source: Statistical Handbook Meghalaya -2014

CAPACITY AND VOLUME:

1	Gallon (Imperial)	=	4.54596	Litres
1	Gallon (USA)	=	3.78533	Litres
		=	0.83268	Gallon (Imperial)
1	Litre	=	0.219967	Gallon (Imperial)
1	Cubic foot	=	28.3168	CubicDecimeters
		=	0.028	Cubic Yards
1	Cubic Yard	=	0.76455	Cubic Metres

AREA

1	Square Inch	=	60.4516 Sq.	Centimetres
1	Square foot	=	0.092903	Square Metres
1	Square Yard	=	0.836131	Square Metres
1	Square Metre	=	1.19599	Square Yards
1	Acre	=	0.404686	Hectares
		=	3.025	Bighas
		=	4.840	Square Yards
1	Square Mile	=	2.58999	Sq. Kilometres
		=	640	Acres
1	Square Kilometre	=	100	Hectares
		=	247	Acres
		=	0.386101	Square Miles
1	Hectare	=	10000	Square Metres
		=	7.46993	Bighas
		=	2.47105	Acres
1	Bigha	=	0.13387	Hectares
		=	0.33058	Acres

Source: Statistical Handbook Meghalaya -2014

Area of land

0.50	Bigha	=	0.07	Hectares
0.75	Bigha	=	0.10	Hectares
1.00	Bigha	=	0.13	Hectares
1.50	Bigha	=	0.20	Hectares
1.75	Bigha	=	0.23	Hectares
2.00	Bigha	=	0.27	Hectares
2.50	Bigha	=	0.34	Hectares
3.00	Bigha	=	0.40	Hectares
4.00	Bigha	=	0.53	Hectares
5.00	Bigha	=	0.67	Hectares
6.00	Bigha	=	0.80	Hectares
7.00	Bigha	=	0.94	Hectares
8.00	Bigha	=	1.07	Hectares
9.00	Bigha	=	1.20	Hectares
10.00	Bigha	=	1.34	Hectares
11.00	Bigha	=	1.47	Hectares
12.00	Bigha	=	1.61	Hectares
13.00	Bigha	=	1.74	Hectares
14.00	Bigha	=	1.87	Hectares
15.00	Bigha	=	2.01	Hectares
16.00	Bigha	=	2.14	Hectares
17.00	Bigha	=	2.28	hectares
18.00	Bigha	=	2.41	Hectares
19.00	Bigha	=	2.54	Hectares
20.00	Bigha	=	2.68	Hectares
21.00	Bigha	=	2.81	Hectares
22.00	Bigha	=	2.94	Hectares
23.00	Bigha	=	3.07	Hectares
24.00	Bigha	=	3.20	Hectares
25.00	Bigha	=	3.34	Hectares
26.00	Bigha	=	3.47	Hectares
27.00	Bigha	=	3.61	Hectares
28.00	Bigha	=	3.74	Hectares

Conversion ration:

1. **Rice (cleaned production):** = $^{2}/_{3}$ **of paddy production**

2. **Cotton:**

(a) Cotton lint production = $^{1}/_{3}$ of the kapas production

(b) Cotton seed production = 2 times of the cotton lint production

3. **Jute:**

(a) 100 yards of hessians = 54 lbs of raw jute

(b) 4148 yards of hessians = 1 ton of raw jute

4. **Groundnut:**

(a) Karnel to nut is shell = 70 %

(b) Oil to nut shell = 28 %

(c) Cake to karnel crushed = 40 %
(d) Cake to karnel crushed = 60 %

5. Sesamum:
(a) Oil to seed crushed = 40 %
(b) Cake to seed crushed = 60 %

6. Rapeseed & Mustard:
(a) Oil to seed crushed = 33 %
(b) Cake to seed crushed = 67 %

7. Coconut:
(a) Oil to copra crushed = 62 %
(b) Cake to copra crushed = 38 %
(c) Copra to nuts = one ton of copra = 116.773 nuts

8. Soyabean:
(a) Oil to soyabean crushed = 18 %
(b) Meat to soyabean seed crushed = 75 %

9. Sugar;
(a) Gur from cane crushed = 10 %
(b) Crystal sugar from gur refined = 62.4 %
(c) Khandsari sugar from gur refined = 37.5 %
(d) Molasis from cane crushed = 3.5 %
(e) Cane thrash from cane harvested = 10.0 %

10. Butter and Ghee:
(a) Butter from mixed mild = 6.9 %
(b) Ghee from mixed mild = 5.5 %
(c) Source: Statistical Handbook Meghalaya -1989

Important formulae

1. Decadal Growth:
Present population - Population before 10 years

2. Decadal growth rate:

$$\frac{Decadal\ \ grout\ h\ (growt\ h\ in\ 10\ years\ )}{Population\ of\ the\ base\ year\ \ (population\ \ \ of\ previous\ \ decade\ )} \text{ x } 100$$

Example: - Population of the town in 1991 = X and population of 2001 is Y

Then, the decadal growth = (Y –X)

Therefore, the decadal growth rate = $\frac{(Y-X)}{X}$ x 100

3. Density of population = $\frac{Total\ \ population\ \ \ of\ the\ defined\ \ area}{Total\ \ defined\ \ area}$ = Persons per km^2

4. Literacy rate = $\frac{Toal\ literate\ persons}{Population\ above\ 7\ years}$ x 100

(a) **Male literacy rate** = $\frac{Total\ male\ literate\ persons}{Above\ 7\ years\ male\ population}$ x 100

(b) **Female literacy rate** = $\frac{Total\ female\ literate\ persons}{Above\ 7\ years\ female\ population}$ x 100

5. Sex ratio = $\frac{Total\ female\ population}{Total\ male\ population}$ x 1000 (Female per 1000 male population)

6. Road Density = $\frac{Total\ road\ length}{Total\ land\ area}$ X 100 = km per 100 km^2

7. Birth rate = $\frac{Total\ live\ birth}{Total\ population}$ x 100

(a) **Crude birth rate**: It is the number of live birth in a year per 1000 population in mid year.

Crude birth = $\frac{B}{P}$ x 1000 where ' B' is the number of births and 'P' is the number of population at mid year.

8. Death rate = $\frac{Total\ number\ of\ deaths\ during\ the\ year}{Total\ population}$ x 1000

(a) **Crude death rate:** It is the total number of persons died per 1000 population in mid year.

Crude death rate = $\frac{D}{P}$ x 1000 where 'D' is the number of deaths and 'P' is the population of mid year.

9. Infant mortality rate = $\frac{Number\ of\ infants\ below\ one\ year\ died\ during\ the\ year}{Total\ number\ of\ live\ births\ during\ the\ year}$ x 1000

10. Maternal mortality rate = $\frac{No.\ of\ maternal\ death\ of\ women\ aged\ 15\ to\ 49\ years\ while\ pregnant\ or\ within\ 45\ days\ of\ termination\ of\ pregnancy\ from\ any\ cause\ related\ to\ pregnancy\ or\ child\ birth}{No.\ of\ living\ woment\ aged\ 15\ to\ 49\ years}$ x 100,000

11. Rate of unemployment = $\frac{Total\ number\ of\ unemployed\ persons}{Total\ number\ of\ labour\ force}$ x 100

Total labour force = main workers + marginal workers + unemployed/seeking or available for work during the year.

Out of labour force = Total population – (main workers + marginal workers + unemployed/seeking or available for work during the year.

12. Employment rate = $\frac{Total\ number\ of\ empoyed\ persons}{Total\ number\ of\ work\ force}$ x 100

13. **Migration rate**: It is the total number of persons migrated per 1000 population at midyear.

$= \frac{M}{P}$ where 'M' is the number of persons migrated and 'P' is the population at midyear.

14. **Poverty rate**: Povery rate is the percentage of the population of the town which earns incomes less than that locally defined poverty line.

$= \frac{PL}{TP}$ x 100 where 'PL' is the number of population below poverty line (locally defined poverty line) and 'TP' is the total population.

15. **Adult literacy rate**: It is the percentage of population aged 15 years and above who can both read and write with understanding a simple sentence with understanding with reference to the total population.

$= \frac{AL}{AP}$ x 100 where 'AL' are the persons aged 15 years and above who are literate and 'AP' is the total adult population aged 15 years and above.

16. **Male adult literacy rate:** It is the percentage of male literate persons aged 15 years and above who can both read and write a simple sentence with understanding.

$= \frac{ML}{MP}$ x 100 where 'ML' is the total number of male literate persons aged 15 years and 'MP' is the total number of female literate persons aged 15 years and above.

17. **Female adult literacy rate**: It is the percentage of female population aged 15 years and above who can both read and write a simple sentence with understanding.

$= \frac{FL}{FP}$ x 100 where 'FL' is the total number of female literate persons aged 15 years and above and 'FP' is the total number of female population aged 15 years and above.

18. **School enrolment rate:**

(a) **Gross Primary School Enrolment rate**: It is the total enrolment in first level education regardless of age divided by the total population of the age group which officially corresponds to primary schooling.

$= \frac{PSE}{PP}$ x 100 where 'PSE' is the total number of children enrolled at first level education and 'PP' is the total number of population in the primary age group.

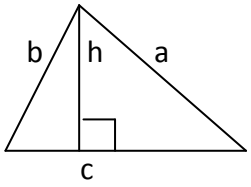
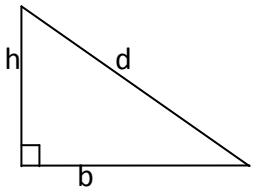
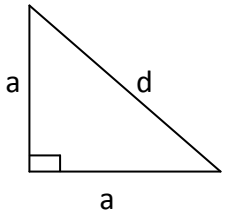
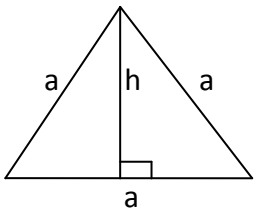
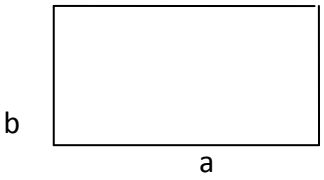
19. **Gross secondary enrolment rate**: It is the total enrolment in secondary level education regardless of age divided by the total number of population of the age group which officially corresponds to secondary education.

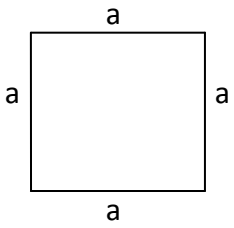
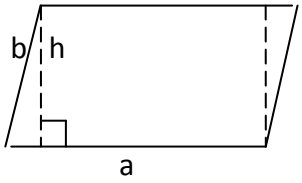
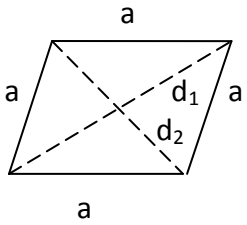
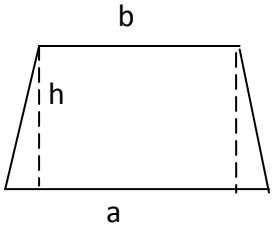
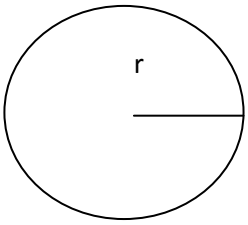
$= \frac{SSE}{PS}$ x 100 where 'SSE' is the total number of children enrolled in secondary level and 'PS' is the total number of population in the secondary age group.

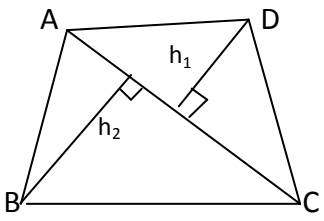
20. **Teacher and student ratio**: It refers to the number of teachers in a school to the total number of students (Primary/Secondary)

= $\frac{WS}{PT}$ x 100 where 'WS' is the total number of students and 'PT' is the total number of teachers.

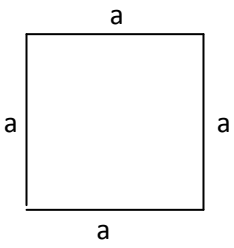
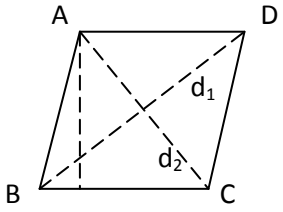
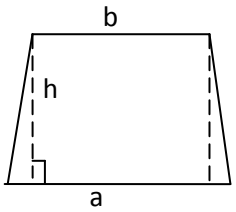
MENSURATATION

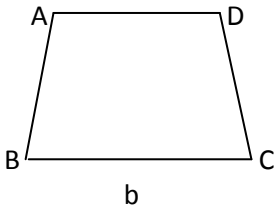
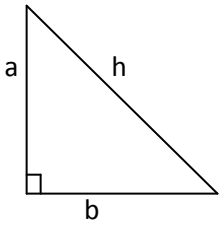
Sl. No	Name	Figure	Perimeter	Area	Nomenclature
1	2	3	4	5	6
1	Triangle		a + b + c, 2s	$\frac{1}{2}ch$	**a, b, c are the sides, h=altitute** **s =** $\frac{a+b+c}{2}$
2	Right Triangle		= (b + d + h)	$= \frac{1}{2}\ bh$	$d = \sqrt{b^2 + h^2}$ $(hypotenuse)$
3	Isosceles Triangle		= (2a + d)	$= \frac{1}{2}\ a^2$	$d = a\sqrt{2}$ $(hypotenurse)$
4	Equilateral Triangle		= 3a	$\frac{1}{2}\ ah \quad or$ $\frac{\sqrt{3}}{4}a^2$	$h = \frac{\sqrt{3}}{2}a$ $(altitude)$
5	Rectangle		= 2(a + b)	= ab	a = Length b= breadth

6	Square		= 4a	$= a^2$	a = side
7	Parallelogram		= 2(a + b)	= ah	***a*** and ***b*** are sides ***h*** = distance between parallel sides of length ***a***
8	Rhombus		= 4a	$= \frac{1}{2} d_1 d_2$	***a*** = sides ***d_1*** and ***d_2*** are diagonals
9	Trapezium		***Sum of the length of all the four sides***	$= \frac{1}{2}(a + b)h$	***a*** and ***b*** are the parallel sides, ***h*** is the distance between them
10	Circle		$= 2\pi r$	πr^2 i) $Radius = \frac{Circumferance}{Diameter}$ where ***r*** is the radius of the circle ii) Circumference $= \pi \; x \; diameter$ $= 2\pi r$	$\pi = phi = \frac{22}{7}$ *r = radius* $\pi = phi = \frac{22}{7}$ *= 3.14*

11	Quadrilateral		***Sum of the length of all the four sides***	Sum of the area of △ ABC + ACD $\triangle ABC = \frac{1}{2}\ x\ AC\ x\ h_1$ & △ ACD = $= \frac{1}{2} x\ AC\ x\ h_2$ **Then Quadrilateral ABCD** $= \frac{1}{2}\ \boldsymbol{x\ AC\ (h_1 + h_2)}$	Area of Quadrilateral = (area of △ ABC + area of △ ACD

Important properties

Sl. No	Name	Figure	Properties
1	Square		(a) Area = a^2 or side^2 (b) Perimeter = 4a (c) Diagonal = $a\sqrt{2}$ (d) Area = $\frac{1}{2}$ x diagonal^2
2	Rhombus		(a) If the diagonals AC = d_1 and BD = d_2, then area = $\frac{1}{2}$ x (d_1 x d_2) (b) Perimeter = 4a or 4 x sides Note: Sides = $\sqrt{\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2}$
3	Trapezium		(a) Area = $\frac{1}{2}$ **X** sum of the parallel sides x perpendicular distance between them. or $\frac{1}{2}$ x (a + b) x height (b) Its altitude = $\frac{2\ x\ \ area}{(a+b)}$

4	Isosceles Trapezium		In an Isosceles Trapezium, its oblique sides are equal i.e. AB = CD **Perimeter of the Isosceles Trapezium:** = (AB + BC + CD + DA)
5	Isosceles Triangle		In right angle triangle, hypotenuse = $\sqrt{base^2 + \ altitute^2}$

Cuboids and Cubes:

1. **Cuboid: A rectangular solid which has six faces all of which has rectangles**

(i)	Volume of Cuboid	=	l x b x h cubic unit, (where l =length; b = breath and h = hight)
(ii)	Surface area of the Cuboid	=	2 (l x b x h) sq unit.
(iii)	Area of the 4 walls of room	=	2 (l x b) x h sq unit.
(iv)	Diagonal of a Cuboid	=	2 (l^2 x b^2 x $h^{2)}$ unit.

2. **Cube: Rectangular solid with every face square. In case of cube, length = breath = height.**

(i)	Volume of the Cube	=	l^3 cubic unit.
(ii)	Surface area of the cube	=	6 x l^2 sq unit.
(iii)	Diagonal of the cube	=	($l^2 + l^2 + l^2$) unit.

Note: In a rectangular closed box, volume of the material = External volume – Internal volume

If 't' is the thickness of the material, then internal dimensions are (l – 2t)(b – 2t)(h – 2t)

Note: In open box, the internal dimensions are = (l – 2t)(b – 2t)(h – t)

INTRODUCTION TO THE CROP CUTTING EXPERIMENT

The main function of the Directorate of Economics & Statistics (DES), Shillong, is the scientific collection, compilation, analyses, interpretation and dissemination of various types of statistical information relating to various socio economic aspects of the State. One of the main functions of the DES is the conducting of Crop Cutting Experiment of different crops under the scheme General Crop Estimation Survey adopting scientific methodology. At the moment, the methodology developed by Indian Agricultural Research Institute, PUSA, New Delhi, is adopted to carry out the crop cutting experiment of different crops.

The main objective of the Crop Cutting Experiment is to obtain the following estimates at the Block level, District level and the State level:

(i) Average yield per hectare of the different crops.

(ii) Production of the crops at the Block, District and the State level.

(iii) Productivity of certain variety of crop.

(iv) To study the productivity of different crops grown under different cultural practices. Various ancillary information like irrigational facilities, type of seeds sown, use of pesticides/insecticides, use of improved methods of cultivation, etc. are collected through this survey.

The Directorate of Economics & Statistics has been the nodal agency for carrying out the Crop Cutting of different crops since the inception of the State. At the moment, this Directorate is conducting Crop Cutting Experiments (CCE) on 13 major crops of the State under General Crop Estimation Scheme. The crops covered under CCE are Winter Paddy, Autumn Paddy, Spring Paddy, Jhum Paddy, Maize, Ginger, Rapeseed & Mustard, Potato (Kharif and Rabi), Jute, Cotton, Turmeric and Wheat.

Out of the thirteen crops covered under the Crop Cutting Experiment, nine crops namely Winter Paddy, Autumn Paddy, Spring Paddy, Ginger, Rapeseed & Mustard, Summer Potato, winter Potato, Maize and Turmeric are notified crops for Crop Insurance. As such the yield repot derived from the CCE are furnished regularly to the implementing Insurance Company for settlement of any insurance claim for shortfall in crop production. This yield report is also furnished to the concerned Departments as well as Ministries.

At the moment, this Directorate is not conducting the Crop Cutting Experiment on Fruits, Vegetables and Orchards. But there is a substantial area reported under these crops and in near future some of these crops is likely to be taken up for the survey. The methodology developed by the Indian Agricultural Research Institute, PUSA, New Delhi, for Crop Cutting Experiment on these crops is included in this manual along with the methodology used for General Crop Estimation Survey.

For conducting the Crop Cutting Experiment on different crops, three stages are involved namely the Block level, the District level and the Directorate level. At each stage, certain level of duties is required to be performed for obtaining these estimates.

The organizational chart below will give clear picture on the duties performed at each stage and also on the procedure of how the Crop Cutting Experiment is conducted.

Block Dev. Officer	District Statistical Officer	Directorate of Economics & Statistics, Shillong.	Different Deptts. & Ministries
1) The Sub-Inspector of Statistics prepares the list of villages growing different crops in consultation with the Gram Sevaks, ADOs, HDOs etc. and the same is approved by the BDO. Thereafter the BDO submits the list of villages growing different crops to the District Statistical Officer (DSO) concerned as per Crop Calendar for conducting the Crop Cutting Experiments of different crops.	'1) The DSO compile the village list of all the Dev. Blocks and submit it to the DES, Shillong, for allotment of sample villages for conducting the Crop Cutting Experiments (CCE). '2) On receiving the selected sample villages from the Directorate office (DES), the DSO give allotment of sample villages to the Field Assistants (F.A.) for conducting the CC Experiments. '3) The DSO scrutinize all the filled in schedules of CCE received from all the F.As. and submits it to the DES, Shillong.	'1) The DES select the sample villages for CCE of different crops and sent back to the District Statistical Officer concerned for conducting the CCE.. '2) The DES analyze and compile various reports like yield and production estimates etc. based on the results of the CCE of different crops. Various ancillary information like type of the seeds sown, irrigational facilities, use of improved method of cultivation etc. are also collected and analyzed through this survey. 3) The analyzed reports are then sent to the Depptts./Ministries concerned of both the State and the Central Govt. (as shown at →)	'1) Directorate of Economics & Statistics, (Deptt. of Agriculture & Cooperation), Ministry of Agriculture, Govt. of India, New Delhi. '2) The Ministry of Statistics & Programme Implementation, Govt. of India. New Delhi. '3) The Agriculture Insurance Company Ltd. (for all the notified crop) for settlement of insurance claim if any. '4) The Department s of Agriculture and Horticulture, Govt. of Meghalaya. 5) Various other line Deptts. of the State Govt. etc.

Field Assistants

1) On receiving the allotted sample villages from the DSO, the Field Assistants conducts the CCE in all the sample villages allotted to them.

2) The results/findings of the CCE are recorded in the prescribed format and submitted it to the DSO concerned for submission to the DES.

From the above, it is seen that all the Sub Inspector of Statistics posted at different Dev. Blocks, all the Field Assistants posted at the District Statistical Offices are directly involved in the survey. The Inspector of Statistics/Sub Inspector of Statistics posted at the District Statistical Offices who are i/c of Agriculture section is responsible for overseeing the conduct of the Crop Cutting Experiment under the control of the District Statistical Officers concerned.

The organizational set up of the Agriculture section of the DES:- The Agriculture section in the Directorate headquarter is headed by the Deputy Director who is under the direct supervision and control of the Director of Economics & Statistics. He is assisted by the following category of technical officers and staffs.

Sl. No	Category of officers/staff	No. of officers/staff
1	Research Officer	1
2	Statistical Officer	1
3	Inspector of Statistics	1
4	Primary Investigator	3
5	LDA	1
	Total officers/staff	**6**

For conducting the Crop Cutting Experiment of different crops, there is a Calendar to be followed at the Block level, District level as well as at the Directorate level. The calendar below shows the last date for submission of the village list growing different crops by the Block Development Officers/District Statistical Officers and also the selected sample villages by the Directorate.

Sl. No	Name of the crop	Last date for submission by the SIS to the DSO	Last date for submission by the DSO to the Directorate	Last date of sending the sample villages to the DSO by the Directorate
1	Autumn Paddy	5th May	10th May	15th May – 30th May
2	Winter Paddy	5th August	10th August	15th August – 31st August
3	Jhum Paddy	5th March	10th March	15th April – 30th April
4	Spring Paddy	5th February	15th February	10th March – 25th March
5	Turmeric	5th May	15th May	15th June – 30th June
6	Maize	5th May	10th May	15th May – 30th May
7	Jute	1st May	5th May	15th May – 30th May
8	Ginger	15th July	25th July	1st August – 30th August
9	Rapeseed &Mustard	1st December	10th December	15th Dec - 31st Dec
10	Summer Potato	15th March	22nd March	25th March – 31st March
11	Wheat	15th March	22nd March	25th March – 31st March
12	Cotton	10th May	15th May	1st June – 30th June
13	Winter Potato	5th August	15th August	20th August – 31st August

The calendar below is followed for submission of the filled in schedules of the Crop Cutting Experiments by the Field Assistants to the District Statistical Officer concerned and also by the District Statistical Officer to the Directorate office.

Sl. No	**Name of the crop**	**Date of submission of the filled in schedules by the Field Assistants to the DSO**	**Date of submission of the filled in schedules by the DSO to the Directorate, Shillong.**
1	***2***	***3***	***4***
1	Autumn Paddy	Before 30th October	Before 10th November
2	Winter Paddy	Before 15th January	Before 30th January
3	Spring Paddy	Before 15th June	Before 25th June
4	Maize	Before 20th October	Before 30th October
5	Ginger	Before 15th February	Before 22nd February
6	Rapeseed & Mustard	Before 10th March	Before 28th March
7	Summer Potato	Before 31st July	Before 7th August
8	Winter Potato	Before 10th January	Before 20th January
9	Spring Potato	Before 10th July	Before 25th July
10	Jute	Before 10th December	Before 30th December
11	Cotton	Before 28th February	Before 10th march
12	Turmeric	Before 18th February	Before 25th February
13	Wheat	Before 15th May	Before 25th May

The methodology developed by the Indian Agricultural Statistics Research Institute (IASRI), Pusa, New Delhi is adopted for the conducting the Crop Cutting Experiments of different crops. The design adopted for the survey is the Stratified Simple Random Sampling where the Development Blocks are taken as the strata. The notified census villages are the first stage units and the fields growing the crops are the second stage units and the experimental plots of the specified size are the ultimate stage units. The sample villages are selected by using simple random sampling without replacement (SRSWOR) where equal probability of selection is given to all the villages in the frame/list.

The Calendar showing the starting and ending of harvesting period of different crops are shown below:-

CROP CALENDAR

Sl. No	Name of Crop	Harvest Starting		Harvest Ending	
		Month	Week	Month	Week
1	*2*	*3*	*4*	*5*	*6*
1	Rice:-				
	a. Winter rice	November	2nd week	December	Last week
	b. Autumn rice	August	1st week	September	2nd week
	c. spring rice	April	2nd week	June	1st week
2	Wheat	March	2nd week	May	1st week
3	Jowar	March	2nd week	May	1st week
4	Bajra	March	2nd week	May	1st week
5	Maize (Kharif)	July	1st week	October	1st week
6	Ragi	July	1st week	October	1st week
7	Small millets	September	1st week	December	1st week
8	Barley	September	1st week	December	1st week
9	Gram	December	1st week	January	Last week
10	Arhar (Tura)	December	1st week	January	Last week
11	Urad	December	1st week	January	Last week
12	Moong	December	1st week	January	Last week
13	Other Kharif Pulses	December	1st week	January	Last week
14	Other Rabi pulses	February	2nd week	March	Last week
15	Groundnut	February	2nd week	March	Last week
16	Sesamum	October	Last week	December	2nd week
17	Rapeseed & Mustard	January	1st week	February	Last week
18	Linseed	February	Last week	April	2nd week
19	Castor seed	February	Last week	April	2nd week
20	Safflower	February	Last week	April	2nd week
21	Nigerseed	February	Last week	April	2nd week
22	Coconut	February	Last week	April	2nd week
23	Sunflower	February	Last week	April	2nd week
24	Soyabean	October	2nd week	November	Last week
25	Cotton (lint)	November	1st week	December	Last week
26	Jute	August	2nd week	October	1st week
27	Mesta	September	3rd week	October	1st week
28	Sannhamp	September	3rd week	October	1st week
29	Black pepper	September	1st week	February	Last week
30	Chillies (green)	August	1st week	December	2nd week
31	Ginger (green)	October	2nd week	December	Last week
32	Turmeric	November	1st week	January	2nd week
33	Arecanut	December	Last week	March	Last week
34	Cardamom	December	Last week	March	Last week
35	Coriander	December	Last week	March	Last week
36	Potato (Kharif)	June	2nd week	September	1st week
37	Potato (Rabi)	November	1st week	December	3rd week
38	Tapioca	October	2nd week	December	Last week
39	Garlic	October	2nd week	December	Last week
40	Sweet Potato	October	1st week	December	Last week
41	Banana	August	1st week	December	Last week
42	Mango	August	1st week	December	Last week
43	Cashewnut	May	1st week	June	Last week
44	Onion	March	1st week	April	Last week
45	Tomato	October	1st week	March	Last week
46	Sugarcane	December	1st week	February	2nd week
47	Tobacco	January	1st week	February	1st week
48	Guar seed	January	1st week	February	1st week

Crop Calendar showing the sowing and harvesting period of different crops

State: Meghalaya

Sl. No.	Name of Agro climatic zone	District	Season	Crops	Sowing period		Harvesting period	
					From	To	From	To
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1	Humid and warm with average rain	1. Ri-Bhoi	1. Kharif	1. Autumn Paddy	April	May	August	September
	fall between 1270-2032 mm (Hills	2. East Khasi Hills		2. Winter Paddy	June	July	November	December
	and rolling undulating piedment)	3. West Khasi Hills		3. Maize	March	April	August	September
2	Humid and hyper-thermic, modera-	4. Jaintia Hills		4. Other cereals and small millets	April	July	October	December
	tely cold in winter and warm in	5. East Garo Hills		5. Tur	April	May	December	January
	summer rainfall varying between	6. West Garo Hills		6. Castor	April	May	January	February
	2800-4000 mm (upper and middle	7. South Garo Hills		7. Sesamum	May	June	November	December
	plateau)			8. Soya bean	May	June	October	November
		New districts:		9. Sweet Potato	June	July	October	December
3	Humid and moderately warm sum-	1. S. W. Khasi Hills		10.Summer potato	January	February	June/July	September
	mer and severe winter, rainfall	2. East Jaintia Hills		11.Cotton	April	May	November	December
	between 2800-6000 mm. (upper and	3. S. W. G. Hills		12.Jute	March	May	August	October
	middle plateau)	4. North Garo Hills		13.Mesta	April	May	September	October
				14.Ginger	April	May	October	December
4	Humid and warm high rainfall ranging			15.Chillies	March	May	August	December
	from 4000 - 10,000 mm. (severely			16.Turmeric	April	May	November	January
	dissected and undulating low hills			17.Sugarcane	April	May	December	February
	gentle to steep slope and rolling pied-			18.Tapioca	April	May	October	December
	ment			19.Other pulses	-	-	-	-
5	Humid and hot rainfall varying from		2. Rabi	1. Wheat	November	December	March	April/May
	2800 mm. (Rolling and undulating			2. Gram pulses	September	October	December	January
	piedment and valley land having			3. Other Rabi Pulses	September	October	February	March
	depressions)			4. Linseed	September	October	February	April
				5. Rapeseed & Mustard	October	November	January	February
				6. Tobacco	October	September	January	February
				7. Spring rice	November	January	March	April
			3. All season	1. Pine apple	September	October	May	October
				2. Banana	May	July	August	December
				3. Papaya	May	July	November	March
				4. Arecanut	June	July	December	March

The existing number of samples planned for CCE of different crops for the year 2014-15 in the Districts are as given below:-

Crops	Districts											Total
	W. G. Hills	S.W.G. Hills	E.G. Hills	N.G. Hills	S. G. Hills	E.K. Hills	W.K. Hills	S.W. K. Hills	E. J. Hills	W. J. Hills	Ri Bhoi	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Winter Paddy	120	40	60	40	80	160	80	40	40	60	60	**780**
Autumn Paddy	120	40	60	40	80	-	20	20	-	40	40	**460**
Spring Paddy	60	40	-	40	80	20	-	20	-	20	60	**340**
Ginger	120	40	60	40	80	100	40	20	-	40	60	**600**
Rapeseed & Mustard	80	40	60	40	80	-	-	-	-	-	20	**320**
Rabi Potato	-	-	-	-	-	120	60	20	20	60	-	**280**
Kharif Potato	-	-	-	-	-	120	40	20	-	-	-	**180**
Maize	48	16	24	16	32	64	32	16	16	24	24	**312**
Jute	8	8	12	8	16	-	-	-	-	-	-	**52**
Wheat	20	28										**48**
Jhum Paddy	12	4	6	4	8	-	-	-	-	-	-	**34**
Cotton			12	8								**20**
Turmeric	-	-	-	-	-	-	-	-	40	40	40	**120**
Total	**588**	**256**	**294**	**236**	**456**	**584**	**272**	**156**	**116**	**284**	**304**	**3546**
Total F.A.	**7**	**3**	**2**	**2**	**4**	**12**	**3**	**2**	**3**	**3**	**3**	**43**
Average sample	**84**	**85**	**147**	**118**	**114**	**49**	**91**	**78**	**39**	**95**	**101**	**82**

Recently, the Directorate of Economics & Statistics in collaboration with the National Informatics Centre, Shillong, has developed computer software for Web Based Application for online transmission of the data/reports of the CCEs. This software is being tested and once fully completed it will speed up the data processing.

From the financial grant under the 13th FC, this Directorate has provided Internet Connectivity with facility of Video conferencing to 6 Districts of the State (one District is pending for connection). Required number of computers along with the accessories has been supplied to the District offices. Laptops have been issued to the Sub Inspectors of Statistics posted at different Dev. Blocks. The District offices are now fully computerized and have been using information technology for maintenance and transmission of the data.

To improve the quality of the data collection from CCE and also supplement the methodology of CCE, the GPS tools are being provided to the Field Assistants for recording the GPS readings like latitude and longitude, elevation of the field, area of the fields etc. All these steps have brought certain improvement on data collection.

Introductory note of the Crop Cutting Experiments

Agriculture is the main occupation of the people of Meghalaya. About 80% of the total population of the state depends on agriculture for their livelihood. However, agriculture land is accounted as only 48% of the total geographical area of the state. In view of the predominant role of agriculture in the state economy, timely, reliable and comprehensive agricultural statistics from grassroots level are of paramount importance. The primary responsibility for collection, compilation and analyzing of agricultural statistics rest entirely with the Directorate of Economics & Statistics, which is the Nodal Agency in the state. The area and production of the crops are collected by each C&RD Block in different districts of the state whereas the yield rates of principal crops are estimated in the Directorate through the Crop Estimation Survey. Besides providing estimates of yield rates, the survey also collects useful ancillary information on the existing cultivation practices like attack of pests and diseases, natural calamity, etc. on the principal crops of the state. The information thus obtained are compiled and analyzed by the Directorate of Economics & Statistics, Shillong, which are submitted every year to the Government of India, Ministry of Agriculture and Co - operation, Directorate of Economics & Statistics and to the National Sample Survey Organization (FOD), Faridabad for over-all account of the status of estimation of agricultural production, etc. in the country and also the technical details and results relating to the improvement of crop statistics.

The survey is conducted through the crop cutting experiment (CCE) in all the selected sample villages as per sampling design.

Objective:- The Crop Estimation Survey conducted through crop cutting experiments are to obtain the

following estimates :-

i) Average yield per hectare of the crop at the block, district and state level.

ii) Production of the crop at the block, district and state level.

iii) Productivity of certain variety of the particular crop at the block, district and state level.

iv) To study the productivity of the crop grown under different cultural practices.

The Survey in general is to estimate by random sampling method the average yield rates and the total production of the principal food and non-food crops. The design adopted in the survey is one of the stratified random sampling where the Community & Rural Development Blocks are taken as strata. The notified census villages are the first stage units and the fields growing the crop under crop cutting experiments are the second stage units and the experimental plots of specified size are the ultimate stage units. The total number of sample villages is selected for the different strata and they are allocated after a consideration of areas under the crop under reference. Within each stratum the allocated numbers of villages are selected with equal probability basing on the frequency etc. In each selected village, two fields sown with the experimental crop are selected by consulting the random number table and by using the assigned random no. allotted against each village. In each selected field, crop cutting experiment is conducted in the experimental plot which is located and marked by consulting the specified column of random number table. At the stage of harvesting, the experiment consists of marking the plot, harvesting, threshing and cleaning the produce and also recording the weight of produce of the experimental plot. The process differs from crop to crop. In the crop cutting experiment, it is necessary to carry out driage experiments to obtain estimates of yield in terms of final dried produce. A set of experiments are selected in a sub-sample of the selected villages and a required sample of grains has to be taken and kept for drying as per method for a specified period. The dry weight should be taken to the nearest possible weighing unit after the grain has dried.

ANNEXURE - B

FIELD OPERATION

GUIDELINE ON CROP CUTTING EXPERIMNET – GENERAL

1. Selection of villages for crop cutting experiment (CCE)

a) All the Community & Rural Development Blocks are to collect the list of villages with area growing the experimental crop. The Sub-Inspector of Statistics in each block is to examine carefully the list of villages and area under the crop before forwarding to the District Statistical Officer in the district. The total block area under the crop should correspond to the area as given in the Block Crop Forecast for the reported year. Likewise the District Statistical Officer of the district should properly examine the reported area given in the list of villages furnished by the blocks. The Block Crop Forecast figures for the corresponding year should be consulted before forwarding the Block village list to Head Office. The list of villages growing the crop under the survey should be furnished every year according to the season to the office of the Director of Economics & Statistics as per calendar given at page 3.

Note:-

1. Sub-Inspector of Statistics in the Blocks should strictly follow the calendar for submitting the village list of the crops for smooth operation of crop cutting experiment.

2. District Statistical Officer should immediately check and forward the village list received from the Block without any delay. Also the DSOs should see that the respective Dev. Blocks submits the village list regularly and in time.

3. For any delay of submission of village list by the Sub-Inspector of Statistics, the District Statistical Officer should report immediately to head office.

b) Required number of villages for CCEs are to be selected by the Head office from each C & RD Block by random sampling method with the help of random number table. Two/four more additional villages are also selected for each block to be taken as substitute in case the selected village is rejected due to some reasons such as village not accessible, crop already harvested, etc, etc.

A pair of four digits random number is allotted to each selected village by consulting the random number table for selecting the field for experiment. In case the additional villages are substituted, the same pair of random numbers allotted to the already selected villages is to be used.

SELECTION OF VILLAGES FOR CROP CUTTING EXPERIMENT OF DIFFERENT EXPERIMENTAL CROPS BY SAMPLING METHOD ARE DONE IN THE OFFICE OF THE DIRECTOR OF ECONOMICS & STATISTICS.

2. Selection of fields for Crop Cutting experiments.

A field in crop cutting experiment is a land or portion of land sown with the specified crop, either pure or in mixture. In Meghalaya where the cadastral dag number is not available to provide a frame of sampling, certain procedure for selection of fields has been adopted. If the selected field is sown with crop in mixture, the experiment may be conducted if it constitutes at least 10 p.c. of the area under the crop.

A. Listing Operation:

1) The first operation of the Field Assistant is to proceed to the selected village. All the cultivators in the village are to be listed and the serial number of the field is to be noted for the selection procedure. This is to be followed by identification. Listing of farmers growing the crop under the survey will be done in the listing schedule and the area under the crop grown by the farmers in the respective field is to be noted in

the schedule. In doing so, the Field Assistant must be satisfied that the information given by the respondent or farmer is correct otherwise the area of the field is to be ascertained by seed rate.

2) The second operation is the selection of the plot for crop cutting experiment based on the assigned two random numbers of four digits against each village as supplied by the head office. The two random numbers are to be used for determining the first and second experiment in the village.

Example:

The random numbers are 2596 for experiment No. l and 1520 for experiment No.2 and the last highest serial number of the field or dag number is 56 (say). Divide 2596 by 56, we get a remainder of 20 which gives that the first experimental plot will be the field serial No.20. Similarly divide 1520 by 56, remainder is 8 and the second experiment will be the field serial No.8. In case the remainder is 0, the last serial number is to be selected.

3) Column number of the random table are to be allotted by the District Statistical Officer to each Field Assistant for conducting the crop cutting experiment and selection is to be made accordingly as laid down.

The field selected according to the serial number which is equal to the remainder should be taken if it is large enough to accommodate the experimental plot and covered by the crop for at least 10 p.c of the area if it is sown in mixture. Otherwise reject it and proceed to the next higher serial number.

4) The first visit to the sample village by the field assistant for listing operation should be sufficiently in advance of harvesting. During listing, the experimental plot AS SELECTED IS TO BE MARKED AND THE CULTIVATOR concerned should be requested not to harvest the marked plot until the Field Assistant revisit again for harvesting on the date fixed with the cultivator.

B) ***Locating and marking of experimental plot:***

1) The procedure for location of the plot should be strictly adhered to by following the method of taking the south west corner as the starting point. Beginning from the starting point i.e. South west comer the location of the plot can be done as follows:-

a) ***For Wet and Jhum cultivation***

To locate the plot for conducting crop cutting experiment in the field of wet and jhum cultivation, we are to start from the South-West corner of the field and measure in steps the length and breadth of the field. From the total number of steps of both length and breadth, deduct seven steps from each and we obtain the remainder. From the allotted column number of the table, select two random numbers. The first one should be the first number of the column not greater than the remainder for length and the second not greater than the remainder for breadth. The pair of random numbers so selected will determine the South-West corner of the experimental plot. For example, if the length is 86 steps the remainder obtained is 86 – 7 = 79 and if the breadth is 45 steps the remainder is 45 – 7 = 38. Each Field Assistant is allotted with column number of the random number table. If column 4 is assigned, this column of the two digit numbers is to be used. The Field Assistant is to start reading down from the top of column 4 and select the first random number which is not greater than 79. In this list of random numbers all numbers preceding the selected one are to be ticked off and the selected number is to be encircled. Similarly, for the breadth, the Field Assistant is to select a random number not greater than 38 of column 4. But it should be started reading down from the one selected for length i.e. after random number 64 selected for the length. Tick off in the list of random numbers all the numbers after 38 and draw a circle round the random number not greater than 38 which is going to be selected one. In this case the pair of random number selected is 64 and 23. For selecting two digits random numbers in subsequent occasion read further down the selected one for length and the breadth i.e. beyond 23 in the same manner as given above. In case the given column number in the list is exhausted start reading down the next higher column number from the top and so on.

To locate the South West corner of the experimental plot by means of the selected pairs of random numbers say (64,23), walk from the starting point of the field along its length and stop at a distance of 64 steps. From this point start walking perpendicular to the length inside the field and stop at a distance of 23 steps. Fix a peg at that point, say peg No. l. Do the measurement of 5 meter by 5 meter according the methods of marking the plot as laid down, measurement of 5m may be done by applying Pythagoras theorem (th.29-Hall & Steven) i.e. in a right-angled triangle, square on the hypotenuse is equal to the sum of square on the other two side (i.e. $c^2 = a^2 + b^2$), if c is the hypotenuse and a, b, are the other two sides).

b) ***For terracing cultivation***

As in the above, in each selected field, the Field Assistant should start from the South West corner of the field for selection and locate the experimental plot. The total number of sub-plots starting from the first sub-plots nearest to the south-west corner of the field in a serpentine manner is to be counted. Selection of the experimental sub-plot is to be done by consulting the specified random number column of the table. For example, if there are 24 number of sub- plots in the selected field, the first random number of the assigned column not greater than 24 should be taken for the experimental sub-plot. Measure the length and breadth of this sub-plot in breadth before conducting the experiment. The following points are to be noted for making the sub-plot.

(i) If length and breadth of the sub - plots are more than 7 steps, location and marking of the experimental plot should be of size 5m by 5m considering the south - west corner of the sub - plot as the south - west of the experimental plot itself. Method of marking is to be followed as laid down. This experimental plot has to be marked during listing.

(ii) If length is more than 7 steps but breadth is less than 7 steps, the entire sub - plots is to be harvested but its length and breadth should be measured accurately and be recorded.

(iii) If both length and breadth are less than 7 steps the sub - plots is to be rejected and select the next available sub - plot which satisfied the condition either (i) or (ii) above.

NOTE: If the sub - plot is irregular in shape, imagine the highest possible rectangle inside the sub - plot and start form the south - west corner of the imaginary rectangle and -measure an experimental plot of 5m by 5m.

If the whole of the plot does not fall within the field due to irregularities in shape or in case, where rocks, trees, wells, streams, etc fall within the plot, reject the pair of selected random numbers of the table and locate the plot again by using fresh pair of random numbers. The pair of random numbers taken cannot be rejected for any other reason.

Marking the experimental plot:- After fixing peg no. 1 in the manner suggested above proceed from that point along the direction of the length of the field and away from the starting point and measure 5 meter and fix another peg (peg no. 2) at that point. That will be the second corner of the point. Now unfold the tape. Fix the ‘Zero’ point of the tape at peg No. 1 and 12.07 meter mark of the tape at peg No.2 and pull the tape holding at 7.07 meter mark away from the starting point. When the tape will be completely stretched on both sides, fix a peg at 7.07 meters mark (peg No.3). This will be the third corner of the plot. Pull in the similar manner, holding the tape at 5 meters mark instead of 7.07meters and fix another peg there. (peg No.4) That will be the fourth corner of the plot. Measure the distance between peg No.3 & No.4 and see that it will be 5 meters. Thus a square plot of size (5mx 5m) is located within the field. If it is differing, repeat the whole operation. Enclose the plot thus marked by passing a string round the peg. See that the string is stretched lightly on all sides. Lower the string gradually to the ground level.

(Illustration of the above operation is given at the Appendix).

c) ***Harvesting:***

Harvesting is to be done when the crop is fully matured and when the cultivators will normally harvest the crop. The date of harvesting is to be fixed by the Field Assistant in consultation with the cultivators concerned during his visit to the village for listing. Stress has to be made to the cultivator not to harvest the marked plot till his next visit on the date as fixed. This is necessary so that the cultivators do not harvest the marked experimental plot, except in case the cultivator wish to make early harvesting due to various reasons like hail storm, untimely rain, etc. Harvest the plants whose base fall wholly inside the boundary and for border plants, the following procedure should be adopted:

Harvesting of border plants lying along the boundary of the marked experimental plot:- The border plants are the plants where the string falls across the plants along the border of the experimental plot. For border plants we are:

i) To include the plants for experimental provided more than half of its portion fall inside the string.

ii) Exclude the plants when more than half fall outside the string.

iii) If by chance, the string passes in such a way that half portion is inside and another half is outside, include the alternate bush of plants of this category.

ALL RESULTS OF HARVESTING TO BE RECORDED IN THE

SCHEDULES AT THE TIME OF HARVESTING IN THE FIELD

d) *Cleaning and weighting:*

Paddy - The produce should be threshed by trampling under foot on hessian cloth and winnowed. Take care and see that there is no loss in the produce at the various operational stages, viz., harvesting, carrying the produce to the threshing ground, threshing, winnowing, cleaning and weighing. Particular care should be taken to see that every grain is separated from all the ear heads and the grain so obtained is free from dust and other foreign materials. Weigh the produce carefully nearest to the smallest unit. As far as practicable, the threshing should be done in the date of harvesting. In any case the time lags between harvesting and threshing should not be more than 2 (two) days. And if by chance the threshing cannot be done on the date of harvesting preserve the produce in a secure place.

e) Driage Experiment:

Driage experiment is to estimate allowance for the harvested crop after it is fully and thoroughly dried and matured. This operation will be conducted by the Field Assistant in the sample village selected for the purpose. Driage experiment is conducted to obtain the conversion factor of the reduction in weight of the harvested crop after it is fully dried.

After weighing the harvested crop of the experimental plot, immediately the Field Assistant is to keep separately 2 kgs in a bag for conducting driage experiment from the sample villages selected for driage experiments. If the total weight of the produce in the experimental plot is less than 2kgs, the whole quantity of the produce is to be taken in a bag for this experiment. The next step is to seal the bag, and label it with detailed particulars the experimental bag number, name of the cultivator, date of harvesting, name of village, block etc, and deposit in a safe - custody of the office of the District Statistical Officer with clear instructions to expose the crop to the sun every day. The Field Assistant should deposit the bag immediately after harvesting experiment in the sample village at the District Office on the same day or latest by the next morning. If the Field Assistant is however unable to deposit the bag containing the quantity for driage experiment within this period, the bag should be handed over to the supervisor officer present at the time of harvesting, who will in turn deposit the same to the District Statistical Office latest by the next day.

For paddy, the first weight of the crop taken for driage experiment should be taken after 10 days of exposure to the sun from the date of harvesting. The subsequent weighing should be observed and recorded in the prescribed schedules every alternate day till the weight is constant. The final weight of fully dried grains is to be recorded. Weighing should be accurate and taken to the nearest small unit.

The above operations for driage experiment are applicable to paddy, maize, wheat, and rapeseed & mustard. However, for rapeseed and mustard the weight of the crop taken for driage experiment should be done in every alternate day from the date of threshing.

The District Statistical Officer will entrust the driage experiment and its observations to some responsible person connected with the work. The District Officer should personally supervise the driage experiment work from time to time.

In case of jute, the crop is to be tied in bundles with string and level them as indicated above. Immediately after the produce of the experimental plot is weighted, leave the bundles in the field for a day or two and thereafter the bundles may be submerged in water in a pond or tank for about say (10-11 days) according to local practice. On the day fixed in consultation with the cultivator for extraction of fiber,

the bundles may be taken out from the tank. Check the number and identification marks of the bundles and then the fiber may be extracted as per local procedure. In case the rotting is not complete, allow the bundles to remain submerged for a few days more until the same is completed. The fiber may be washed thoroughly and allowed to dry in the sun for a day or two. When the fiber is completely dried, the weight of the dry fibers may be taken to the nearest small units with a spring balance provided. Record the result in the supplied schedules and the produce taken for experiment is to be returned to the cultivator.

SUBMISSION OF RETURNS/SCHEDULES

All entries in the schedules are to be done in a sample village itself during the visit and at the time of conducting the experiment. The Schedules are to be filled in duplicate and submitted to the District Statistical Officer who will forward one copy to the Director of Statistics, Meghalaya after careful scrutiny. All ancillary information as provided in the schedules should be specified and filled at the time of conducting the experiment. Care should be taken that the ancillary information given is properly entered by consulting the cultivators concerned.

KITS FOR CROP CUTTING EXPERIMENT:

Each Field Assistant is to be provided with the crop cutting experiment kit as noted below and he will be responsible for keeping them in his safe custody. The following are the essential equipments:

i) A Measuring tape of 30 meters length.

ii) A set of scales and standards weights up to the smallest units.

iii) A spring balance (for jute)

iv) Small gunny bags for driage experiment

v) A coil string of 30 meters length.

vi) Hessian Cloth

vii) Four straight, long bamboo pegs each of 1 meter length with spiked at one end and iron collars at the other end.

viii) A set of instruction table, schedules and the stationeries.

Particular Cases:

In the case of potato, maize and ginger crops, cultivation and harvesting practices slightly differ from that of paddy.

Method of conducting crop cutting experiments

POTATO AND GINGER CROPS

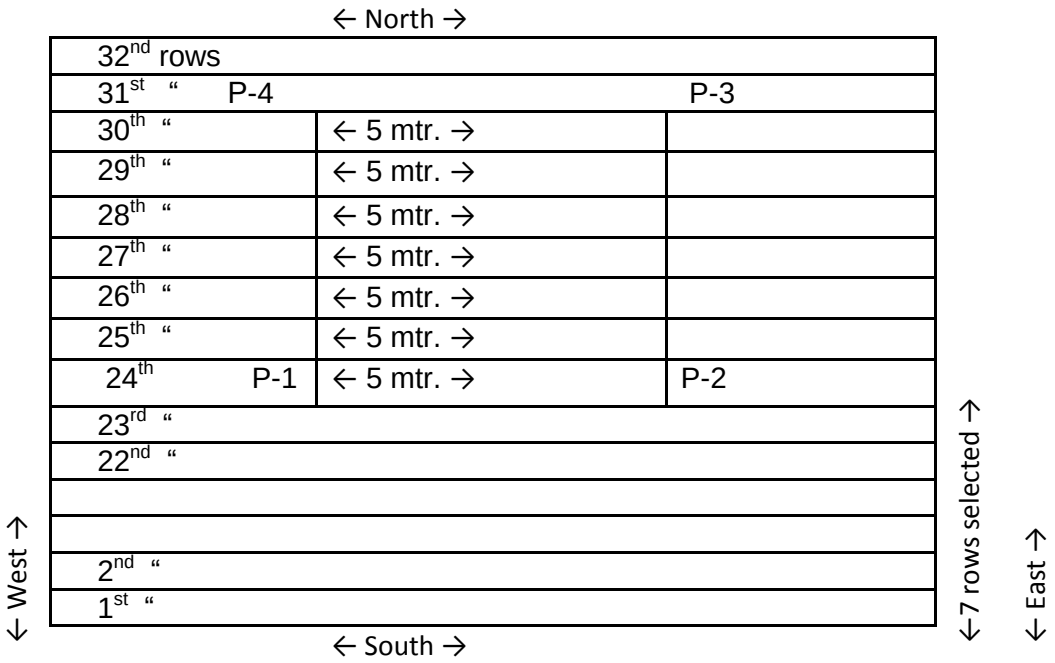
a) Locating & marking of experimental plot:

First type: In each selected field, one sub-plot is to be selected for harvesting operation of potato and ginger, stand at the south-west corner of the field and count the total number of sub-plot starting from the first sub-plot nearest to the south-west corner of the field in a serpentine manner till all the sub-plots in the field are accounted for. In this case the sub-plot is defined as the portion of land sown with the crop or the raised bed in which the crop is grown. From the total number of sub-plots, select one sub-plot by consulting the specified random number column allotted. Measure with tape the exact length and breadth of the selected sub - plot and record it in the prescribed form of the schedule.

Second type: - Another type of cultivation of potato or ginger is that the crop is grown all over the field. The problem here is to locate the experimental plot. Proceed in the same way for getting two pairs of random numbers as indicated. Now suppose the random numbers are 04, 23 under general case.

To locate the southwest corner of the experimental plot by means of the pair of random numbers, say (64, 23), walk from the southwest corner of the field along the direction of rows and stop at a distance of 64 steps. From this point, walk perpendicularly across the rows counting 23 rows and stop. Fix a peg at the middle of row no. 23rd and 24lh and say, it is peg no. 1 (southwest corner of the experimental plot). Now, proceed from that point along the direction of length and away from the starting point and measure 5 meters and fix another peg (say peg no.2) at the middle of interspaces between 23rd and 24th row. Count 7 consecutive rows away from peg no.l and fix a peg no.3 at middle of interspaces between 30th and 31st row. Join peg no.l and peg no.3 by a string and see that it is at right angle with the rows and lower the string so that it touches the rows. Measure 5 meters along each of the 7 rows from the touching point of the string and the rows away from the southwest corner and give marking at each of these points. Measure the distance between peg no. l and peg no. 3 and record the same in the schedules. The experimental plot consisting of 7 rows of potato each measuring 5 meters length obtained as per procedure noted above should be demarcated well before harvesting that is during listing operation and the cultivator should be requested not to harvest this demarcated plot until the Field Assistant visits for harvesting or the date fixed with the cultivator.

Illustration:-



b) Harvesting & Weighing (Potato/Ginger)

Harvest the crop by usual procedure and collect the potatoes/ginger including those which might have been out in lifting and clean them by rubbing with a piece of cloth. If the potatoes are covered with mud, dry them by spreading on the hessian cloth for some time and rub them. Make sure that not a single potato/ginger is left out underground. Obtain the weight of the cleaned potatoes of the experimental plot and record them in the form. Potatoes/Ginger which are so badly spoiled or diseased as to be unfit for human consumption and would normally not be sent to markets should be excluded.

Note: It is preferable to complete the harvesting before noon.

MAIZE CROP

a) ***Locating and marking of experimental plot:***

The method of locating and marking of experimental plot for maize is similar to that of potatoes and ginger but in case of maize, the crop is also planted by seeds broadcasting process as in the case of paddy. Thus the procedure of selecting and marking is to be followed as in the general case noted above.

The detail procedure of selecting and marking are as follows:-

1) Selection and marking of experimental plot during listing as per procedure.

2) Field Assistant should consult the cultivator to assess the period in which the grain formation of the maize crop takes place when the Field Assistant will visit again which will be the second visit. In this second visit, that is, when the grain formation is due, the Field Assistant should perform the following operation:

i. Counting of all maize crops within the experimental plot.

ii. Counting of the total number of maize cobs in the experimental plot. Please note that NOT A SINGLE COB IS MISSED during counting and if a single cob is harvested or already taken before counting, the Field Assistant should proceed to the next immediate sub-plot.

iii. In the case of selected driage experiment, the Field Assistant during their second visit should mark the experimental plot and also to mark the cobs for driage experiment as per procedure given below:-

In (50% of the experiments conducted) the experimental plot every third alternate cobs starting with the first are marked and identified until all the cobs are exhausted. Identification of the cobs should be clearly marked. The cultivator should be requested not to harvest the marked cobs until the date fixed with the cultivator for harvesting. The number of identified cobs should be noted down that those cobs are meant for the experiment at the harvesting stage.

b) Harvesting stage :

The Field Assistant should undertake third visit exclusively for driage experiments of maize where harvesting procedure has to be performed as follows:

When the maize in the experimental plot is fully matured, all the marked cobs are harvested, counted and recorded in the prescribed schedule, they are to be kept in a bag in a safe custody. Record the no. of cobs and the name of the cultivator, name of the village, number of experiment with a date, clearly on it. When all the harvesting operations are over the grains are separated from the cobs, bag wise, and keep in the same bag for driage. When the grains are completely dried, the exact weight of the grains, up to the nearest gram, should be noted down. Please note down the no. of cobs in each bag and record the name before separating the grains.

RAPESEED & MUSTARD

For rapeseed & mustard, the procedure is the same as that of paddy given under general case that after the produce is harvested, it has to be immediately removed to assured place and allowed to dry for 8 to 12 days more or less according to local practice, depending on the maturity of the crop harvested for threshing. The date for threshing should be fixed with the cultivator in the date of harvesting itself. Other operational procedures for weighing are the same as that of other crops. Care should be taken that not a single grain is left in the plants.

Response:-

The response is one of the important factors in determining the success of the survey. If the response is high, it minimizes the error and increases the accuracy of the estimates. Response in crop cutting experiment is that the number of planned experiments should be achieved in conducting the experiments.

SUPERVISION

Supervision is the most important stage of crop cutting experiment where a number of villages to be supervised are randomly selected in each district. The supervision programme includes all operational stages i.e. selection of field, locating and marking of the plot, harvesting, threshing, cleaning and weighing the produce.

Supervisory staff /officers should consult the programme of the Field Assistants for such sample villages. The supervision programmes are to be conducted during the operational stages performed by the Field workers. The following are the detail outlines for the supervision:-

ALL FINDINGS ARE TO BE RECORDED IN THE PRESCRIBED SUPERVISION FORMS

a) ***Listing Schedule:***

On reaching the sample village, the listing schedule listed by the field staff is to be checked to ascertain that all the cultivators in the village are included. This can be performed by consulting the village headman/ Secretary.

b) ***Selection of field*** :

By consulting the assigned pair of random numbers for the sample village, the selection of the field is to be seen whether correct or not. If found incorrect and the correct field still remain to be harvested, the selection may be changed and proceed for supervision for the freshly selected correct field otherwise proceed to the next higher serial number.

c) Area of the selected field is to be verified.

d) ***Selection of experimental plot:***

Before proceeding for supervision of the selected experimental plot, the first thing is to check the demarcated marked plot which is to be done during listing operation. It is very important that the Field Assistant should make a rough marking of selected experimental plot. For long standing crops the marking should be made by long sticks during listing operation with a request to the cultivator not to spoil the marks so that he can easily locate the plot when he visits for harvesting and also for supervising operation.

Selection of the experimental plot/ sub - plot using the specified column number of random table should be properly checked. The south - west corner direction should be properly marked and see that the selection of the experimental plot is correct.

e) ***Marking of experimental plot:***

Actual marking of the plot within a field is to be done on the date of harvest. Marking of the experimental plot is to be done correctly according to laid down procedure from the total number of sub-plots, one has to be selected by consulting the specified random number column. In the case of sub-plots under the crops (excluding potato), the following condition should be strictly followed for marking:-

i. If length and breadth of the sub-plot are more than 7 steps, location and marking of the experimental plot should be of size 5m x 5m considering the South-West corner of the Sub-plot as the South West corner of the experimental plot itself. Method of marking is as given in the instruction for field operation. Care has to be taken while harvesting the border plants as noted earlier.

ii. If length is more than 7 steps but breadth is less than 7 steps, the entire sub-plot is to be harvested but the length and breadth should be measured accurately and to be recorded.

iii. If both length and breadth are less than 7 steps, the Sub-pot is to be rejected and select the next available sub-plot which satisfied the condition either (I) or (ii) above.

iv. If the sub-plot is irregular in shape, imagine the highest possible rectangle inside the sub-plot and determine the South-West corner of the imaginary rectangle. Mark a square plot of size 5m x5m as per detail given in the instruction.

f) ***Harvesting***:

Proper care has to be taken to see that harvesting of the produce is meticulously done. Method of including and excluding the border plants has to be strictly followed as noted earlier.

Threshing of paddy has to be done on the same day after harvesting with proper care that no grain is lost. Winnowing the produce has to be properly done before taking its weight. Weighing the produce should be done carefully nearest to smallest units.

Care has to be taken to see that there is no loss of grain of the produce during harvesting, carrying the produce to the threshing ground, threshing, winnowing, cleaning and weighing. Every grain is to be separated from all the ear heads and the grains so obtained are free from dust and foreign material.

g) Driage Experiment

The driage experiment is to be conducted in selected village only. The experimental produce taken for driage experiment should be properly kept in a bag and in a safe custody. In the field, required detail particulars are to be filled in the prescribed schedule. The supervisory officer should properly see that required quantity of the produce is correctly measured and kept in bag to be properly sealed.

The field worker is to deposit the bag at the District office immediately after the harvesting operation in the sample village. If the field worker is unable to deposit immediately the bag containing the produce for driage experiment, the bag should be handed over to the Supervisory Officer present at the time of harvesting who in-turn will deposit the bag at the District Statistical Office on the same day or latest by next day morning.

h) ***All Field Assistants should carry the entire crop cutting experiment kits***.

i) ***The Supervisory officer should record all findings*** during supervision in the prescribed supervision for which includes general crop condition, use of inputs, cultivation practices, nature of calamity (if any), etc.

j) ***Supervisory officer should note down*** the geographical height or altitude of the selected field whether high land, medium or low land with the help of altimeter as follows:-

Highland – Above 1, 1000 MSL

Medium – 700 - 1, 100 MSL

Low Land – Below 700 MSL.

All remarks of the Supervisory officers should be recorded in details.

HOW TO SELECT THE FIELD

Two four digits random numbers are allotted against the village selected in consultation with the random number table. For the other villages selected for substitution, no separate pair of random number are allotted. In case a substitute is taken from additional villages selected, the random no. allotted to the original village will be the allotted random number.

Example:

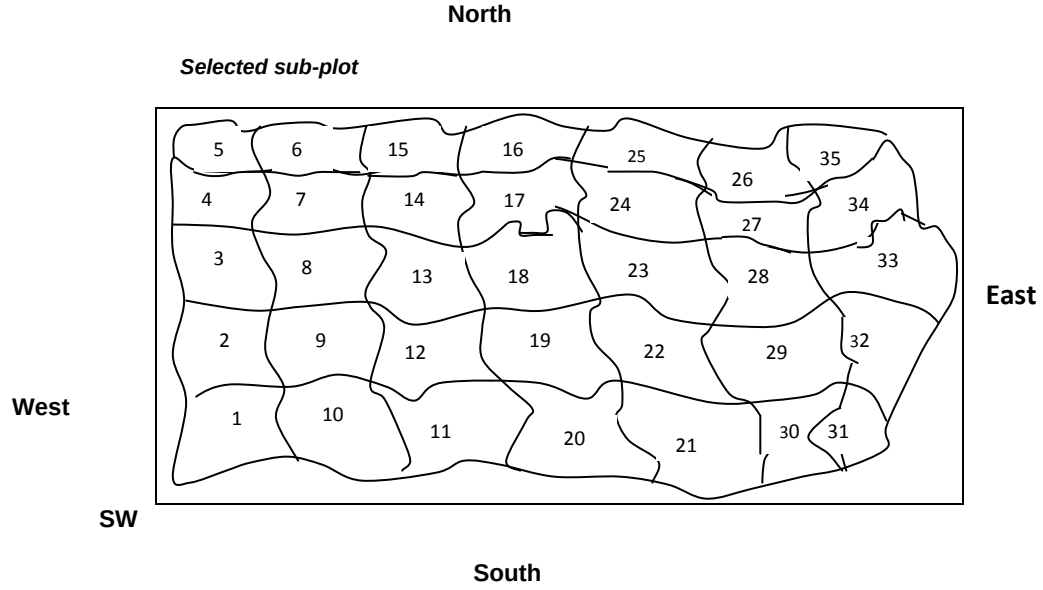
Sl. No	Name of the village	Pair of Random Numbers	
1	Village W	2359	3492
2	Village X	5437	3434
3	Village Y	9451	1500
4	Village Z	8431	3097
	Additional villages		
1	Village A		
2	Village B		

If village Y is rejected, then village A or B will be substituted for village Y. The random no. allotted against village Y will be the random no. for village taken for substitution. Suppose the experimental crop is paddy, name of village: X (say)

Sl. No	Name of the cultivator	Paddy fields	Identification note	Running sl. No.
1	Cultivator A	I	Near the stream	1
		II	Near the big stones	2
		III	Near the tree	3
		IV	Near the house	4
2	Cultivator B	I	“	5
		II	“	6
		III	“	7
3	Cultivator C	I	“	8
		II	“	9
		III	“	10
		IV	“	11
		V	“	12
		VI	“	13
4	Cultivator D	I	“	14
		II	“	15

Against village X, two numbers are allotted and they are 5437 and 3434. In this village X (say), there are cultivators A, B, C, D and the Total number of fields in this village is 15 (last running serial number). Divide 5437 and 3434 by 15 and the remainders are 7 and 14 respectively. The selected fields will therefore be running serial No. 7 and 14 and these are to be encircled as shown. These selected fields are to be made sure that they are large enough to accommodate the experimental plot and covered by at least 10 percent of the crop if it is sown in mixture. Otherwise reject it and proceed to the next higher serial number.

HOW TO SELECT AN EXPERIMENTAL SUB-PLOT



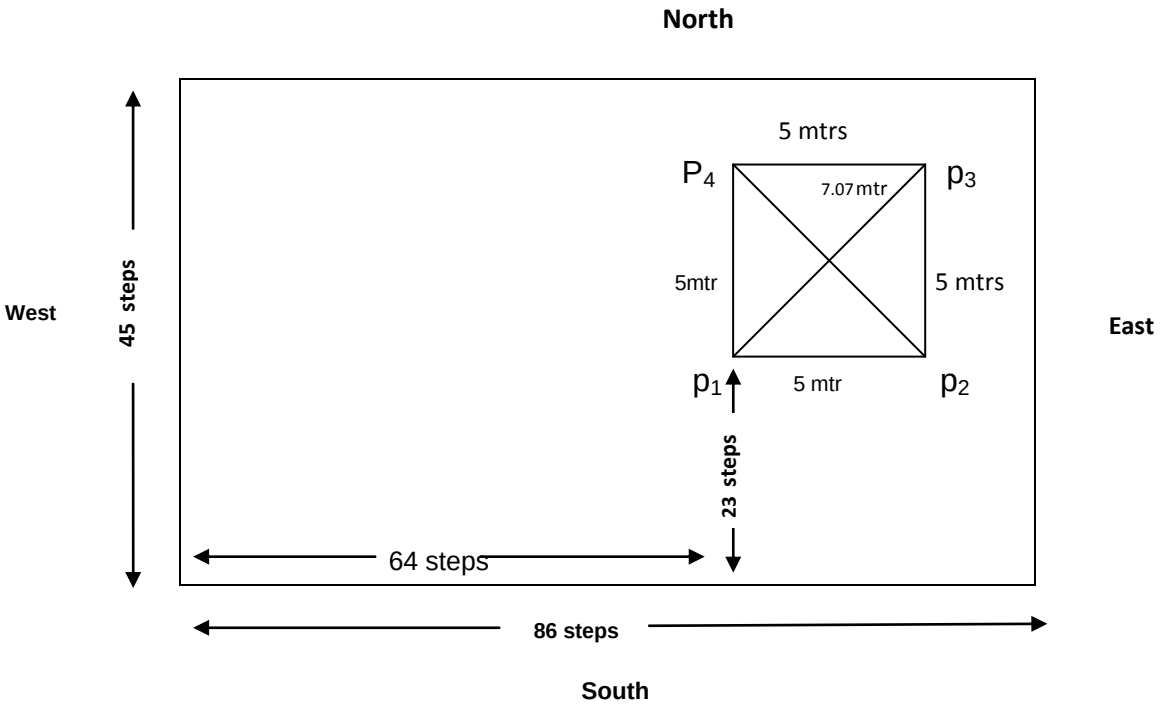
Suppose in the above selected field there are 35 sub-plots (hali). At the time of counting the sub-plots, we are to assign No. 1 to the sub-plot nearest to the southwest corner of the field. Proceeding in the direction of water retention bunds we are to assign numbers serially to the other sub-plots in manner shown in the diagram. Since we are to assign a number to each sub-plot of the field by counting them in a

serpentine manner, after reaching the last plot in the first line say (sub-plot No.5), we assign no. 6 to the subplot just below or above the sub-plot 5 and proceed again in the direction of the water retention bunds to the last sub-plot in the second line of roughly situated just below or above the sub-plot No.l and assign number serially. We are to assign numbers serially to all the sub-plot in the field. Thus we are getting 35 sub-plot in the selected field. Counting of sub-plot in the above manner instead of counting haphazardly is necessary so as to facilitate identification of the sub-plot finally selected for experiment.

Suppose column no. 12 of the random table is allotted for this purpose. We are to select a number from this column which is less or equal to the total number of sub-plots (i.e. 35) since the total number of sub-plots is a two digits number, consult column No. 12 of two digits random number table. Proceeding from the top of column No. 12 select a number which is equal or less than the total number of subplots i.e. 35. The first random number in this column not greater than 35 is 04. So the sub-plot No. 4 will be selected for experiment. The random numbers preceding the selected one are to be ticked off and the selected random number are to be encircled. To select random number in subsequent occasion, start reading down column 12 beyond 04. When the total number of sub-plots is one of three digits figure consult the column 12 of one or three digited random number table respectively. When a column in a random number list is exhausted, consult the next higher column in the list and so on. If both length and breadth of this sub-plot are less than seven steps, reject subplot No. 4 and select the next sub-plot i.e. sub-plot No.5. In case the length and breadth of this sub-plot are also less than seven steps, then select sub-plot No. 6 and so on.

Appendix -3

Diagram explaining the selection of experimental plot of 5m x 5m size.



Appendix-4

The following four diagrams will illustrate the marking of experimental plot in the different type of sub-plot:-

Illustration-1: Length and breadth are greater than seven steps

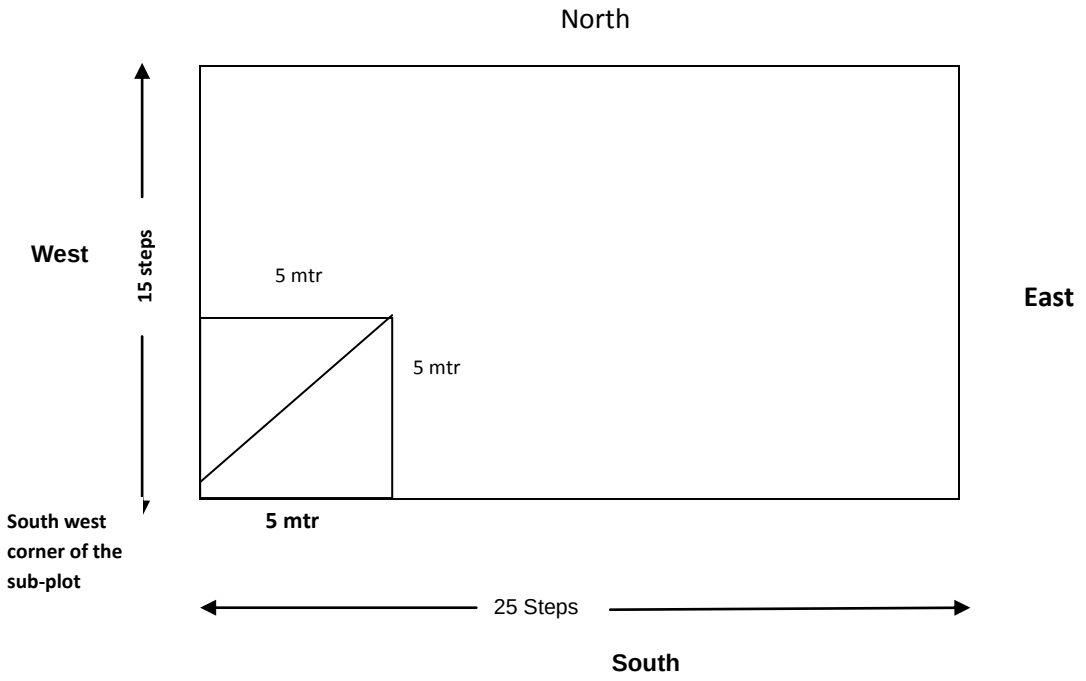


Illustration-2: Breadth is more than seven steps, but irregular in shape

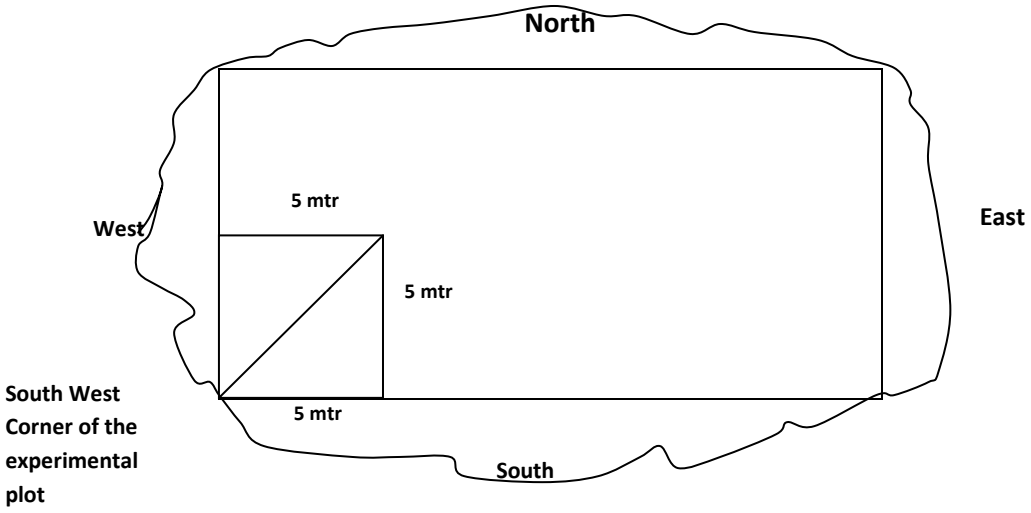


Illustration-3: Breadth of the selected sub-plot is less than seven steps.

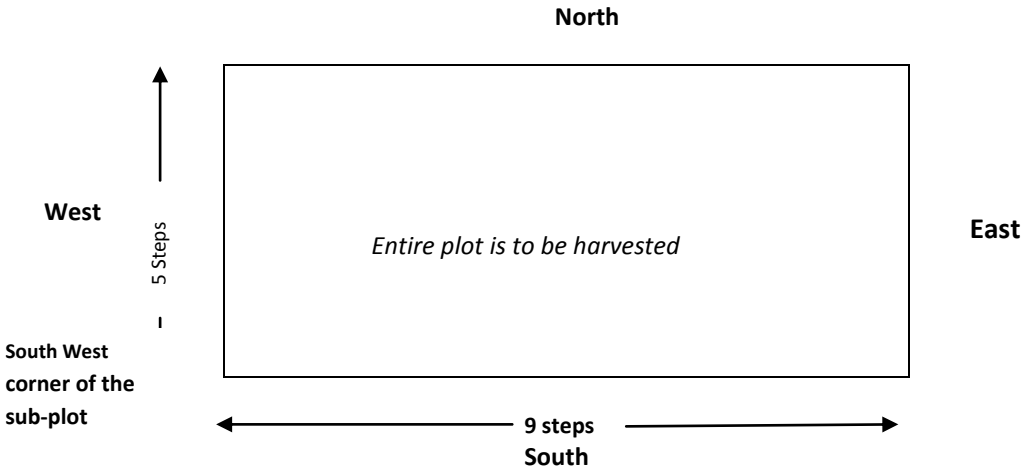
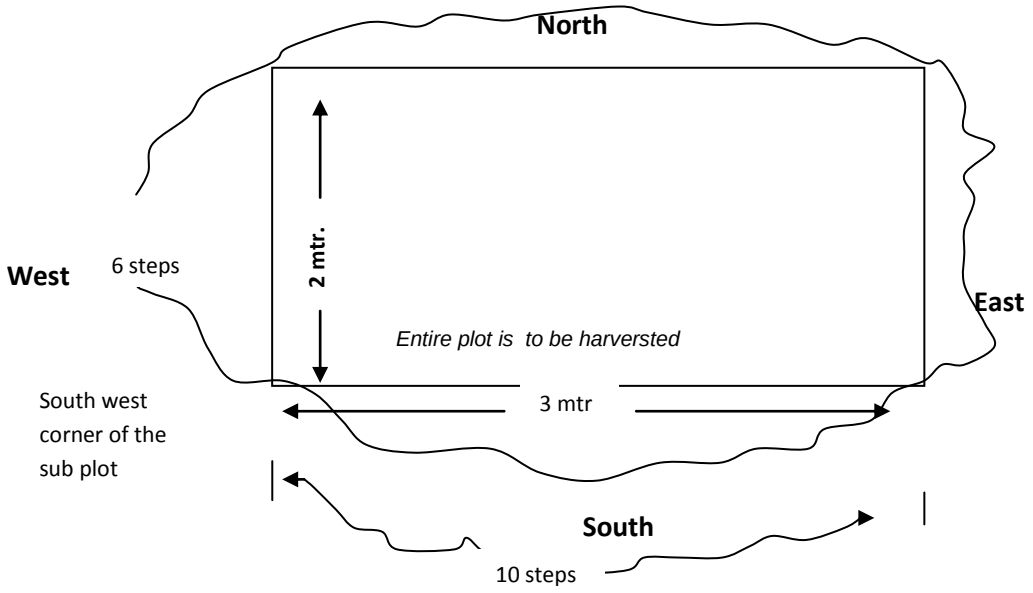


Illustration-4: Breadth of the Sub-plot is less than seven steps and the shape of the sub-plot is irregular.



The above illustrations apply mainly in terracing cultivation which is followed as per procedure noted below:-

In each selected field, stand at the South West Corner of the field and count the total number of sub-plots (Hali) starting from the first sub-plot nearest to the South-West corner of the field in a serpentine manner till all the sub- plots (Hali) in the field are counted for. The sub-plot is defined in this case as the portion of land sown with the crop and bounded in all sides generally by contour of water retention bunds. From the total number of sub-plots, select one sub-plot by consulting the specified random number column. Measure the length and breadth of this sub-plot, thus selected in steps. If both length and breadth of this sub-plot are more than 7 steps then locate the experimental plot of size 5m×5m in that sub-plot considering the South-West corner of the subplot as the South-West corner of the experimental plot itself. The method of marking is same in other area (Illustration-1 in appendix-IV). If the sub-plot is irregular in shape (as shown in Illustration-2 in appendix-IV) imagine the highest possible rectangle inside the sub-plot and determine the South-West corner of the imaginary rectangle and consider it as the South-West corner of the experimental plot. Mark a square plot size (5m×5m) with this point as South-West corner and harvest the crop falling inside the experimental plot.

In case when the breadth of the sub-plot is less than seven steps then harvest the entire sub-plot (Illustration-3 in appendix-IV). But the length and breadth of the sub-plot should be measured accurately with the tape and the same may be recorded in the appropriate column provided in the schedule. If the sub-plot is not rectangular in shape, imagine the highest possible rectangular inside the sub-plot and fix four pegs at the four corners of the imaginary rectangle (Illustration-4 in Appendix-IV). Tie a string to the peg No.1 (nearest to the South-West corner of the sub-plot) and take it round all the other three pegs and finally tie it again to peg No.1 see that the string is properly stretched. Lower the string to the ground level and then harvest plants which fall inside the string. For border plants same procedure may be adopted as described before. In this case the length and breadth of the imaginary rectangle may be recorded in the form instead of the length and breadth of the sub-plot. In case when both length and breadth of the selected plot are less than seven steps, reject this sub-plot and select the next available sub-plot which satisfies the above conditions(i.e. at least one side of the sub-plot should be more than or equal to seven steps).

ESTIMATION PROCEDURE FOR CROP ESTIMATION SURVEY

The method generally adopted for estimating the average yield of a crop and sampling error is outlined below:-

At the stratum level, the average yield of a crop is obtained as a simple arithmetic mean of plot yield (net) within it. The stratum means are then combined using area under the crop in the stratum to give a weighted average yield for the district. The average yield for the state is arrived at as a weighted mean of district yield with corresponding crop area as weight.

Symbolically, the district average yield.

$$\overline{X} = d \times f \times \frac{1}{\sum_{i=1}^{k} a_i} \times \sum_{i=1}^{k} a_i \overline{x}_i$$

Where x_i = sample arithmetic mean of the net yield of sample cuts in the ith stratum (the next yield for cut taken from a field growing the crops in mixture is obtained by dividing the actual yield by eye estimate of the proportion of area under the crop in the field obtained by the primary workers at the time of crop cutting experiments, while in case of a cut from the field growing the pure crop in the same as the actual yield of the crop).

a_i = net area under the crop in the i^{th} stratum (i.e. some of the area under pure crop and the apportioned area under the crop from all mixed crops having the crop as a component, the apportionment being done at field level on basis of eye estimates at the time of area enumeration in some states and at district level in others on the basis of conventional ratios)

k = number of strata in the district.

d = driage factor (i.e. allowance for driage).

f = conversion factor for converting the yield per cut to yield per hectare.

The sampling variance of the mean V($\bar{X}$) is obtained as follows:-

$$V(\bar{X}) = \frac{d^2 f^2 \times \left(F \sum_{i=1}^{d} \frac{a_i^2}{n_i} \right) + (E - F) \left(\sum_{i=1}^{d} \frac{a_i^2}{\grave{A}_i n_i^2} \right) \times \left(\sum_{j=1}^{m_i} n_{ij}^2 \right)}{\left(\sum_{i=1} a_i \right)}$$

Where a_i and n_i are respectively, the area under the crop and the number of experimental plots in the i^{th} taluk. E, the mean square between villages and F, the square within villages.

$\acute{A}_i$ is defined as $\grave{A}_i = \frac{n_i^2 - \sum_{j=1}^{m_i} n_{ij}^2}{n_i (m_i - 1)}$ where 'i' is the number of villages in the i^{th} taluk.

$$E = \frac{\sum_{i=1}^{d} \left[\sum_{j=1}^{m_i} \left(\frac{\sum_{k=1}^{n_{ij}} y_{ij}^2}{n_{ij}} \right) - \frac{\left(\sum_{j=1}^{m_i} \sum_{k=1}^{n_{ij}} y_{ijk} \right)^2}{n_i} \right]}{\sum_{i=1}^{d} (n_1 - 1)}$$

$$F = \frac{\sum_{i=1}^{d} \left\{ \sum_{j=1}^{m_i} \sum_{k=1}^{n_{ij}} y_{ijk}^2 - \sum_{j=1}^{m_i} \left(\frac{\left(\sum_{k=1}^{n_{ij}} y_{ijk} \right)^2}{n_{ij}} \right) \right\}}{\sum_{i=1}^{d} (n_i - m_i)}$$

And % of SE($\bar{X}$) = $\frac{\sqrt{V(\bar{X})}}{X} \times 100$

Notes:

(i) In case the crop sown is pure, the net yield is the same as the actual yield obtained from the plot.

(ii) If the crop is sown in mixture, then the net yield is obtained by dividing the actual yield by the eye estimate of the proportion of area occupied by the concerned crop as per the primary worker at time of crop cutting experiments.

(iii) Net area under the crop in a stratum is the sum of the area under the pure crop and the apportioned area under the crop from all mixed crops having the crop as component, the apportionment being done at the field level on the basis of eye estimation or conventional ratio at the time of area enumeration.

Specimen Listing Schedule of the Crop Cutting Experiments

(Commonly used for all the Crops)

GOVERNMENT OF MEGHALAYA

DIRECTORATE OF ECONOMICS & STATISTICS

MEGHALAYA ::: SHILLONG.

Crop Estimates Survey on ……. for the year 20 ……

Form A (H) List of growing fields

District …….. Sub-division …… Block ……..

Village ……. Name of Field Assistant ……

Type of cultivation ……..

Sl. No	Name of the Cultivators	Serial number of field	Running serial number	Identification marks	Approximate Area (In hects)		Remarks
					Irrigated	Un-Irrigated	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*

Specimen Schedules for CCE on Paddy
(Commonly used for Winter Paddy, Autumn Paddy, Spring Paddy, Jhum Pddy),
Wheat and Rapeseed and Mustard
Schedule - 1

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF ECONOMICS & STATISTICS
MEGHALAYA ::: SHILLONG.

Crop Estimation Survey on …….. Paddy for the year 20

Form I (H)- Particulars of the selected village and fields.

Note -1. Answer every item without leaving any item blank.

2. Prepare two copies and submit to the District Statistical Officer, who will forward one copy to the Director of Economics & Statistics, Shillong after proper scrutiny

Identification particulars of the village-	Investigation particulars
1. District ……	1. Name of Field Assistant ……..
2. Subdivision ……..	2. Date of first visit to the village …….
3. Circle/Block ……..	3. Name and designation of the village official accompanied: ……..
4. Mouza No……	4. Are the Chitha and village map available ? ..
5. Village ……..	5. Date fixed for harvesting ……
6. Distance of village from Circle/Block Headquarters …..	

Particulars of selected village	Experiment - I	Experiment - II
1. Area under paddy (in hect.) Irrigated (a) Wet cultivation		Un-irrigated***
(b) Terracing		
(c) Jhuming		
(d) Total		
2. Total number of dags/field under wet/terracing/jhuming cultivation		
3. Date of commencement of harvesting in the village		
4. Selection of dag/field 1. Random numbers assigned for selection of dag/field		
2. Reminders on division by the highest dag No./total No. of fields.		
3. Mention the dag No./field rejected because- (a) Dag No. is not sown with the crop (b) The crop was already harvested		
(c) The dag No./field did not contain any daura or sub-plot of required size. (d) Others (state the reasons)		
4. Dag No./field finally selected for experiment.		
5. Particulars of selected dag No./field- (1). Area under ---------- ---------- paddy (a) Pure sown (b) Mixed sown (gross area)		
(2). Name of the cultivator		
6) Selection of sub-plot for terracing type of cultivation		
1. column of random number assigned for selection of sub-plot		
2. Total number of sub-plot (s) in the field(s)		
3. mention the sub-plot number finally selected		
4. Sub-plot number finally selected.		
7) Particulars of selected sub-plot for terracing type of cultivation		
1. If the sub-plot is sown mixed, state the name(s) of other crops and the proportion of area under different crop mixtures.		
2. (a) Length of the selected sub-plot in meters		
(b) Breadth of the selected sub-plot in meters		
3. Average width of bund in the selected sub-plot.		

8) Particulars of the selected field for the wet and jhuming type of cultivation. **1. Whether the selected field is sown with …paddy as a single crop or mixed with other crops**		
2. If the selected field is a mixed cropping one, state the name(s) of other crops sown mixed and the estimate of proportion of area under different component crops.		
'3. Name of the last crop(s) grown and month and year of harvesting		
4. (a) Length of the selected field in meters		
(b) Breadth of the selected field in meters		
5. Average width of bund in the selected field		
6. Irrigated or un-irrigated, if irrigated		
(a) The source of Irrigation		
(b) Whether irrigation was as a result of development activities		
7. If manured during the current year, the quantitty applied in qtl. Per hect.		
(a) Compost		
(b) Farm - yard manure		
(c) Fertilizer		
(d) Green manure		
(e) Others (specify)		
8. Sed sown (Whether Local or improved), if improved-		
(a) The name		
(b) Source of availability		
(c) Year when obtained		
9. Method of sowing (transplanted or broadcasts)		
10. Soil (a) Type (clay, loamy, sandy)		
(b) Level (high, medium, low)		
11. Mention whether any improved method of cultivation and crop protection measure was adopted		
(a) Japanese method of cultivation		
(b) Use of improved plough		
(c) Use of other improved agricultural practices		
(d) Use of insecticides		
12. Remarks if the crop in the selected field suffered damaged by-		
a) Disease		
b) Insect pests		
c) Weed infestation		
d) Animals, birds, etc.		
e) Abnormal weather		
f) Flood		
g) Others (specify)		

Desk scrutiny	Field supervision	
Date of scrutiny _____ Date of despatch _____ Signature of District Statistical Officer	General comment on the quality of field work Signature of Supervisory Officer Designation Date ……..	Date of submitting to the District Statistical Officer Signature of Field Assistant

Schedule - 2

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF ECONOMICS & STATISTICS
MEGHALAYA ::: SHILLONG.

Crop Estimates Survey on …….. Paddy (in hills District 20

Form II (H) - Details of harvesting experiment

Notes 1. Answer every item without leaving any item blank

2. Prepare two copies and submit to the District Statistics Officer who will forward one copy to the Director of Statistics, Meghalaya after proper scrutiny.

District …… Subdivision …….. Block ……..

Mauza ……Village …… Name of Field Assistant ……..

Particulars	Experiment I	Experiment II
1. Dag No./Field finally selected … … ….		
2. Marking of experimental plot in wet and jhuming cultivation		
(a) Length of the selected field in meters ……. …….		
(b) Breadth of the selected field in meters ……. …		
(c) Length - 5 in meters … … … … …		
(d) Breadth - 5 in meters … … … …		
(e) Column of random number cunsulted in the list		
(I) One digit … … … … …		
(II) Two digits … … … … …		
(IV) Three digits … … … …		
(f) Random number selected for length and breadth		
(g) Pair of random numbers rejected and reasons thereof.		
3. Marking of experimental plot in terracing cultivation…		
(a) Length of the selected sub -plot in meters		
(b) Breadth of the selectyed sub-plot in meters		
(c) acual length of the sub-plots in mtrs. …		
(d) Actual breadth of the sub-plots in mtrs. …		
4. Actual date of harvesting …….. ……. …		
5. Date of threashing if different from above ….		
6. Weight of paddy of the experimental plot …		
7. Did the cultivator harvest any of the selected field earlier ?		
If so, effect the position of the experiment plot ?		
8. Reasons, fi the yield from the experimental plot is markedly different from the rest of the field.		
9. Was the selected field effected adversely either by flood insect posts etc. subsequent to the dispatch of Form (H).		
10. In respect of the village selected for driage experiment, state. **(a) Whether the bags sealed properly …. … …** **(b) Where the bags kept … … … … …**		

Desk scrutiny	**Field supervision**	
Date of scrutiny _____ **Date of despatch _____** **Signature of District Statistical Officer**	**General comment on the quality of field work** **Signature of Supervisory Officer** **Designation** **Date ……..**	**Date of submitting to the District Statistical Officer** **Signature of Field Assistant**

Schedule –I (for CCE on Maize)

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Maize Form I (H) - For selected fields

1. Answer every item without leaving village and selected fields.

2. Prepare two copies and submit to the Statistical Officer who will forward one copy to the Director of Statistics, Meghalaya, after proper scrutiny

Name of the Field Assistant …….. ……..Block ……..……
Village …… Date (s) of visit ……

Particulars	Permanent	Jhum cutivation	Total
1. Total area under Maize in the village (in Hects)			
2. Highest serial number of fields in Form A (H)			
3. Date of commencement of harvesting			
4. Random numbers assigned for selection of field			
5. Remainders of division by the highest serial numbers of fields			
6. Mention of fields rejected becouse			
(a) the crops was already harvested			
(b) Other (Specity)			
7. Field numbe finfally selected for experiment			
8. (a) Area underr Maize in the selected field			
(i) Pure sown			
(ii) Mixed sown			
(b) If sown mixed, state the name of other crops and proportion of			
of area under different component crops			
9. Length (L) and Breadth (B) of the selected fields			
10. Number of sub-plots of the selected fields			
11. Number of rows in the selected fields			
12. Average number of sub-plots in the rows			
13 .Average distance			
14. Average distance between two rows of sub-plots			
15. Average size of a sub-plot -(a) Length			
(b) Breadth			
16. Area of uncultivated inside the fields (in sq. Mtr.)			
17. Average spacing on the sides of the fields			
18. Name of cultivators			
19. Name of the last crops grown and month and year of harvesting			
20. If manured during the current season, the quantity applied:-			
(a) Compost			
(b) Farm-Yard Manure			
© Fertilisers (specify)			
(d) Other (specify)			
21. Seeds sown (Local or improved), if improved give the name and			
source of availability			
22. Date of sowing seeds			
23. Soil (a) type: Clay, Loamy, Sandy)			
(b) Level: (High, Medium, Low)			
24. If any crop protection measures adopted by using insecticides?			
25. Remarks if the crop in the field suffered damage by			
(a) Disease			
(b) Insects, pests			
© Animal, Birds etc.			
(d) Abnormal weather			
(e) Others (specity)			

Date of scrutiny ……..	**Date of Date of submission**	
Date of despatch ……	**to the Statistical Officer**	
Signature of District Statistical Officer	**Signature of Field Assistant**	

Schedule – 2 (for Maize)

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Maize
Form II (H) - Details of harvesting Experiment

1. Answer every items without leaving village and selected fields.
2. Prepare two copies and submit to the Statistical Officer who will forward one copy to the Director of Statistics,
Meghalaya, after proper scrutiny

Name of the Field Assistant …… …….. ……...Block …….……..
Village …… Date (s) of visit ……..

Particulars	Experiment - I	Experiment - II
1. Field finally selected for experiment		
2. Number of sub-plots in the selected field		
3. Length of the sub-plot (in Mtr. and Cms)		
4. Breadth of the sub-plot (in Mtr. and Cms.)		
5. Total number of Maize plants in the experimental sub-plot		
6. Actual date of counting		
7. Total number of cobs marked and identified for driage from exptl. plot.		
8. Total number of cobs marked and identified for driage		
9. Did the cultivator harversted any cobs of the selected field earlier ?		
If so, did it affect the position of the experimental sub-plot?		
10. Was the selected sub-plot affected adversely by weather, insects,		
pests etc. subsequent to the despatch of Form I (H)		

Task scrutiny Field supervision Date of submitting to the Statistical Officer

Date of scrutiny …….. General comments on the quality of field work

Date of despatch ……..

Signature of the Statistical Officer Signature of the Supervisory Officer Designation. Signature of the Field Assistant

Schedule –III (for Maize)

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Maize
Form III - Weight of dried grains of Maize

Name of the Field Assistant _____ Name of the District _____
Subdivision _____ Block _____ Village _____

Particulars	Experiment - I	Experiment - II
1. Number of the Field selected		
2. Name of the cultivator		
3. Number of cobs in the bag		
4. Date of separation of grains		
5. Date of weighment of dried grains		
6. Weight of dried grains		
7. Remarks		

NOTE: (I) Item no. 6 above to be filled in only when two consecutive weights of dried grains are constant.
(2) Prepare two copies of the Form and submit to the District Statistical Officer, who will forward one copy to the Director of Statistics, Meghalaya after proper scrutiny.

Signature of Inspecting Officer,

Designation _____
Date _____

Signature of Field Assistants

Date of dispatch
_____

Shedule – I (for Potato and Ginger)
GOVERNMENT OF MEGHALAYA
DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on _____ Potato/Ginger
Form I (H) - for selected fields

1. *Answer every items without leaving village and selected fields.*
2. *Prepare two copies and submit to the Statistical Officer who will forward one copy to the Director of Statistics, Meghalaya, after proper scrutiny*

Name of the Field Assistants _____ Block_____
Village _____Date (s) of visit _____

Particulars	Per. Cultvm.	Jhum cultvn.	Total
1. Total area under _____ Potato/Ginger in the village (in Hects)			
2. Highest serial number of the fields in Form A (H)			
3. Date of commencement of harvesting			
4. Random number assigned for selection of fields			
5. Remainders on division by the highest serial numbers of fields			
6. Mention of the fields rejected because:-			
(a) the crops already harvested			
(b) others (specify)			
7. Field number finally selected for experiment			
8. (i) Area under _____ potato/ginger in the selected field			
(a) Pure sown			
(b) Mixed sown			
(ii) If sown mixed, state the name of other crops and proportion of area under different component crops	Mtrs L. B.	Mtrs L. B.	Mtrs L. B.
9. Length (L) and Breadth (B) of the selected field			
10. Number of sub-plots in the selected field			
11. Number of rows in the selected field			
12. Average number of subpots in the rows			
13. Average distance			
14.(a) Average distance between two rows of sub-plots			
(b) Date of sowing of the crop in the field			
15. Average size of the sub-plot - (a) Length			
(b) Breadth			
16. Area of uncultivated inside field (in sq ft.)			
17. Average spacing on sides of the field			
18. Name of cultivator			
19. Name of last crops grown and month and year of harvesting			
20. If manured during the current season, the quantity applied:-			
(a) Compost			
(b) Farm-Yard manure			
© Fertiliser (Specify)			
(d) Others (specify)			
21. Seeds sown (Local or improved), if improved give the name and source of availability.			
22. Soil (a) Type: (Clay, Loamy, Sandy)			
(b) Level: (High, medium, low)			
23. Is any crop protecting measures adopted by using insecticides?			
24. Remarks, if the crop in the field suffered damage by			
(a) Disease			
(b) Insects, pests			
© Animal, Birds etc.			
(d) Abnormal weather			
(e) Others (specity)			

Date of scrutiny ……

Date of submitting to the Statistical Officer

Date of despatch ……..

District Statistical offocer

Signature of Field Assistant.

Schedule – II (for Ginger and Potato)

GOVERNMENT OF MEGHALAY

DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Potato/Ginger

1. Answer every items without leaving village and selected fields.
2. Prepare two copies and submit to the Statistical Officer who will forward one copy to the Director of Statistics, Meghalaya, after scrutiny

Name of the Field Assistant _____ District _____ Sub-Division_____
Block _____ Village _____ Date of visit _____

Particulars	Experiment - I	Experiment -II
1. Field finally selected for experiment		
2. Number of sub-plot in the selected field		
3. Length of the sub-plot (in Mtrs)		
4. Breadth of the sub-plot (in Mtrs)		
5. Actual date of harvesting		
6. Weight of the produce of the experimental sub-plot		
7. Did the cultivator harvest any part of the field earlier? If so, did it affect the position of experimental sub-plot?		
8. Reason, if the experimental plot is markedly different from the rest of the field?		
9. Was the selected sub-plot affected adversely by weather, insects, pests, etc. subsequent to the despatch of Form I (H)		

Task scrutiny

Date of scrutiny _____

Date of despatch _____

Field supervision

General comments on the quality of field work

Date of submission to the Statistical Officer

Signature of the Statistical Officer

Signature of the Supervisory Officer

Signature of Field Assistant

Schedule – I (for Cotton)

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on _____ Potato/Ginger
Form I (H) - for selected fields

1. *Answer every items without leaving village and selected fields.*
2. *Prepare two copies and submit to the Statistical Officer who will forward one copy to the Director of Statistics, Meghalaya, after proper scrutiny*

Name of the Field Assistants _____ Block_____
Village _____Date (s) of visit _____

Particulars	Permanent cultivation	Jhum cultivation	Total
1. Total area under _____ Potato/Ginger in the village (in Hects)			
2. Highest serial number of the fields in Form A (H)			
3. Date of commencement of harvesting			
4. Random number assigned for selection of fields			
5. Remainders on division by the highest serial numbers of fields			
6. Mention of the fields rejected because:-			
(a) the crops already harvested			
(b) others (specify)			
7. Field number finally selected for experiment			
8. (i) Area under _____ potato/ginger in the selected field			
(a) Pure sown			
(b) Mixed sown			
(ii) If sown mixed, state the name of other crops and proportion of area under different component crops	Mtrs L. B.	Mtrs L. B.	Mtrs L. B.
9. Length (L) and Breadth (B) of the selected field			
10. Number of sub-plots in the selected field			
11. Number of rows in the selected field			
12. Average number of subpots in the rows			
13. Average distance			
14.(a) Average distance between two rows of sub-plots			
(b) Date of sowing of the crop in the field			
15. Average size of the sub-plot - (a) Length			
(b) Breadth			
16. Area of uncultivated inside field (in sq ft.)			
17. Average spacing on sides of the field			
18. Name of cultivator			
19. Name of last crops grown and month and year of harvesting			
20. If manured during the current season, the quantity applied:-			
(a) Compost			
(b) Farm-Yard manure			
(c) Fertiliser (Specify)			
(d) Others (specify)			
21. Seeds sown (Local or improved), if improved give the name and source of availability.			
22. Soil (a) Type: (Clay, Loamy, Sandy)			
(b) Level: (High, medium, low)			
23. Is any crop protecting measures adopted by using insecticides?			
24. Remarks, if the crop in the field suffered damage by			
(a) Disease			
(b) Insects, pests			
© Animal, Birds etc.			
(d) Abnormal weather			
(e) Others (specity)			

Date of scrutiny ……

Date of submitting to the Statistical Officer

Date of despatch ……..

District Statistical offocer

Signature of Field Assistant.

Schedule – II (for Cotton)

Form for Crop Estimation Survey of Cotton

F O R M - II

Block _____ Village _____ District _____

Particulars	Experiment -I	Experiment-II
1. Name of the cultivator		
2. Area of the selected field (in sq. mtr)		
3. Variety of Cotton green		
4. Date of sowing		
5. Date/month of flowering		
6. Average distance from each plant in the experiment		
7. Date of survey		
8. Condition of crops (Good/fair/poor)		
9. Percentage of crops (in mixed crops in 10 x 5 sq. mtr.)		
10.Any other information available		

Signature of the superrvisor with remarks

Signature of Field Assistant with remarks

Schedule – III (for Cotton)

Form for Crop Estimation Survey of Cotton

F O R M - II

Information about Cotton in experimental plots for the year _____

District_____ Block _____ Name of the Village _____

First Experiment				2nd Experiment			
Name of Cultivator	No. of plants within 10x5m	No. of Cotton balls found in the experiment and picked	Weight of cotton ungined 5x5m	Name of Cultivator	No. of plants within 10x5m	No. of Cotton balls found in the experiment and picked	Weight of cotton ungined 5x5m
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*

Signature of the Field Assistant with seal

Signature of Supervisory Officer with remarks

Signature of District Statistical Officer with seal

Remarks

Schedule – I (for Jute)

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Jute
Form I - Particulars of the selected village and selected fields

Name of the Field Assistant _____ District _____
Subdivision _____ Mauza _____ Village _____Date of vistit _____

Particulars	Experiment - I		Experiment -II		
1. (a) Total cultivated area in the village					
(b) Total area of jute in the village	Capsularies		Oliterius		Total
(i) Irrigated					
(ii) unirrigated					
Total					
2. Highest serial number of dag in Form A or A (H)					
3. (a) Random nos. assigned for selection of dags/fields	Experiment I		Experiment II		
(b) Remainders on division by the highest serial number of dag					
© Dags/fields rejected if any and the reasons thereof					
(d) Dags/fields finally selected					
4 (a) Area under Jute in the selected dags/fields	Pure sown	mixed sown	Pure sown	mixed sown	
(i) Capsularies					
(ii) Olitorius					
Total					
(b) Number of fields in the dags					
(a) Pure sown					
(b) Mixed sown					
5. Name of the cultivator					
(a) Whether the selected field is sown with Jute as a single crop or sown mixed with other crops					
(b) If the selected field is a mixed cropping one, state the name of other crops sown mixed and estmate the proportin of area under different component crops					
6. Name of the last crop/crops grown and month and year of its harvesting					
7. Length (L) and Breadth (B) of the selected field in Mtrs.					
8. Average width of bund in the selected field					
9. Irrigated or unirrigated, if irrigated					
(a) the source of irrigation					
(b) whether irrigation was as a result of develolpment activities					
10. If manured during the current season, the quantity applied in mounds per acre					
(a) Compost					
(b) Farm-Yard manure					
© Fertilizer (name)					
(d) Green manure					
(e) Others (specity)					
11. Seed sown (whether local or improved), if imporved give:-					
(a) The name					
(b) Source of availability					
© Year when obtained					
(d) Capsularies or Olitorious					
12. Soil (a) Type (Clay, Loamy, Sandy)					
(b) Level (High, Medium, Low)					
13. Mention whether any improved method of cultivation and crop protection was adopted					

(a) Use of improved plough			
(b) Use of the improved Agricultural implements			
© Use of insecticides			
14. Remarks, the crop in the selected field suffered damaged by			
(a) Disease			
(b) Insects, pests			
© Weed infestation			
(d) Animal, birds, etc.			
(e) Abnormal weather			
(f) Flood			
(e) Others (specity)			
15. Date of sowing			

Desk scrutiny

Date of scrutiny ……

Date of despatch ……..

Signature of the District Statistical Statistical Officer

Field Supervision

General comments on the qulity of the field work

Signature of the supervisory Officer

Designation _____

Date _____

Date of submitting to the District Statistical Officer

Signature of Field Assistant

Schedule – II (for Jute)

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Jute
Form II (H) - Green weight of produce from experimental plots.

Name of the Field Assistant _____ District _____
Subdivision _____ Mauza _____ Village _____Date of visit _____

Particulars	Experiment - I		Experiment -II	
1. Dags/fields finally selected				
2. (a) Length (L) and Breadth (B) of the selected field in Metres	L.	B.	L.	B.
(b) Length - 5 and Breadth - 5 in metres	L - 5	B - 5	L - 5	B - 5
3. (i) Column of random numbers consulted in the list				
(a) One digit				
(b) Two digit				
© Three digit				
(ii) Random number selected for length and breadth				
(iii) Pair of random numbers rejected and the reason thereof				
4. Date of harvesting				
5. (a) Number of bundles of produce				
(b) Weight of bundles:				
Bundle 1				
Bundle 2				
Bundle 3				
Bundle 4				
Bundle 5				
Bundle 6				
Bundle 7				
Bundle 8				
Total				
6. Did the cultivator harvest any part of the selected field earlier? If so did it affect the position of the experimental plot?				
7. Reasons, if the yield from the experimental plot is markedly different from the rest of the field?				
8. Was the selected field affected adversely either by flood, insects, pests etc. subsequent to the despatch of Form I				
9. In respect of the village selected for driage experiment, state				
(a) Whether the bundles are tied properly with easily identification marks				
(b) Whether the bundles are submerged in water, give name of pond or tank, etc.				
10. Date fixed for extraction of the fibre				

Desk scrutiny **Field supervision**

Date of scrutinuy _____ General comments on the quality of the field work

Date of submitting to the District Statistical Officer

Date of despatch _____

Signature of District Statistical Officer

Schedule – III (for Jute)

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF ECONOMICS & STATISTICS, SHILLONG

Crop Estimation Survey on Jute
Form III - Weight of the dry fibre

Name of the Field Assistant _____ District _____
Subdivision _____ Mauza _____ Village _____Date of vistit _____

Particulars	Experiment - I	Experiment -II
1. Dag number/fields selected		
2. Name of cultivator		
3. Date of extracting fibre		
4. Date of weighment of dry fibre		
5. Weight of dry fibre		
6. Remarks		

Signature of Inspecting Official
Designation _____
Date _____

Signature of Field Assistant
Date of despatch _____

Note:- (i) Prepare two copies of the Form and submit to the District Statistical Officer, who will forward one copy to the Director of Statistics, Meghalaya after proper scrutiny.

Random Number Tables for selecting the sample villages for CCE of different crops.

RANDOM SAMPLING NUMBERS

1	2	3	4	5	6	7	8	9	10	11	12	13
3893	9728	1764	2503	7539	6871	2346	8397	7043	0702	9285	4652	9747
7030	6938	0022	9601	1320	5896	1105	1171	4248	3623	4638	9031	1501
2952	9313	3534	4968	5488	6311	4523	8484	8232	2424	0102	2030	6041
2154	6443	2276	9558	8697	0630	5075	3377	1111	1158	3648	0641	8966
8713	4618	9542	6108	3234	0638	3703	4545	3840	2438	1855	8479	8741
4209	7757	7736	5042	1528	6535	1257	2740	6776	1620	1800	9917	4104
4129	9974	3151	6524	4864	0418	7137	7283	3510	7677	2082	6276	3019
0805	8519	1607	1138	8609	1128	7283	1516	3690	7086	5997	7287	7868
8325	9683	4169	4001	9091	0318	1778	9932	4153	2979	2827	592	1998
8409	8106	0365	6957	0641	8658	8646	7150	2203	4399	1221	6499	1732
3912	3256	6001	1107	7044	8020	4924	7149	9351	7766	6230	0769	1187
0338	5370	5405	9712	9624	6253	6000	3604	3817	2593	1074	8678	9438
5751	0047	1750	3112	5874	1052	1913	9600	9916	1589	7151	0178	4273
5222	5383	5165	2473	4449	1893	9960	9199	5807	6665	7420	3392	0038
3135	4359	5683	5902	9871	9705	8155	2206	2682	1114	0864	0264	1196
0371	0030	6826	8269	5668	2349	1896	8336	3560	5509	8490	4089	4448
1656	1312	0994	5702	0862	6948	1734	9863	3590	7162	3787	9376	1897
8756	3806	1289	8011	8539	5848	3374	9505	1459	4203	8068	3039	3406
3369	2389	5108	9040	7066	3710	1331	6511	7759	1285	6074	8971	1429
3347	4596	2769	4041	3988	1945	8040	7714	5351	4666	7143	0673	8153
8878	5573	8990	3534	1770	5983	2463	2795	1858	4550	6754	9092	9668
9504	9977	0423	0519	1233	8725	9306	5073	2659	6847	9969	2464	9943
6244	0522	4636	7230	0734	6425	0580	1323	5556	2662	2247	3027	8238
1326	4308	1894	2516	9617	5277	7880	6115	8452	5471	3593	5754	5383
7916	6494	8799	2674	6322	2083	4214	7113	0181	0053	0001	4358	1067
3567	1682	4741	3365	5050	1379	0728	4378	6559	1944	0527	7178	3221
6555	9605	0797	0799	4191	0171	8104	0145	5375	4244	4979	5035	8194
8325	5814	2169	9048	3565	0276	7315	0950	8948	7899	2996	3318	6675
4067	8578	1115	5459	3582	4746	3122	7701	7144	6215	9624	9058	7793
7718	9877	2278	4849	4972	6408	2913	6634	9793	5662	9860	7886	8896
3737	0280	5337	9558	3672	2753	9364	8515	8614	5321	0333	3354	4572
6243	4169	0729	6745	5464	8374	5494	5329	2469	8913	8603	3415	6046
7923	8748	2695	7979	3760	0476	3181	6536	7355	8185	9024	3918	7844
8733	6831	0849	9722	1559	0089	8771	0697	4294	0681	1176	6138	2536
9894	1557	7785	0438	9303	2090	4241	6162	4431	7019	6640	3825	9502
0516	3391	2087	8715	8414	7125	7331	9084	1817	1338	5027	1349	8037
2710	5067	7724	4547	0299	7130	9466	2325	6562	4539	8634	4234	3408
3523	2885	8624	6882	5690	2982	8541	1048	8609	5303	0588	6880	7934
4508	4769	7880	3123	6591	4350	2526	9908	7309	9940	9357	0714	7620
8105	5346	3323	7527	4693	8679	9184	2976	2894	5928	5935	3448	7582
3406	9802	8851	6314	4553	9254	0646	2601	8368	9446	4453	5711	3100
4332	5248	0937	9685	3868	3323	4454	1129	7336	6694	0215	2588	9557
0083	0155	3944	7074	5153	4293	2081	7784	1192	4518	5413	8581	5603
1214	0023	6522	8483	7061	2377	9477	9201	9730	0354	5810	8475	4815
5107	5453	1869	7946	9211	9553	7077	2559	1918	8676	9771	0272	7100
8619	6507	8927	0912	1910	3340	1885	9509	4544	9965	4602	7383	3085
0114	7369	9793	8257	2131	6102	3403	2359	6764	0111	0900	5126	6053
2939	0607	2478	4015	6483	4460	6895	5338	6170	4167	3141	2064	3040
7450	1925	0723	5933	5563	4144	6348	7787	9628	6690	3059	9315	7270
8104	2447	2848	5520	4846	9754	9604	7072	6567	0500	9776	6814	5574

RANDOM SAMPLING NUMBERS- *Contd*

14	15	16	17	18	19	20	21	22	23	24	25	26
3617	3440	4043	4003	2602	2472	9833	2972	9572	0198	8742	5411	2150
7128	6638	8185	7563	6398	1943	2900	0630	6821	7481	2299	1697	4129
9000	6633	8999	3096	9690	9179	1172	8239	9861	2322	1474	7106	6007
6006	4660	5866	6219	0959	0422	4681	7646	5000	2943	3662	2535	0385
6344	7968	8780	4660	2801	4996	5469	7329	9497	4445	8694	4339	6322
4980	1954	0243	1674	7133	0971	7724	4501	4838	4950	9678	3325	2577
8427	6144	7428	7995	5309	0146	4169	4322	3568	6732	7009	0020	5117
8416	8788	4606	8910	8559	8001	5666	9428	1650	1620	2675	2418	3252
9884	8584	9504	7334	2703	2519	8123	2261	4317	5125	5791	6158	8773
0563	3431	5566	2900	9956	1425	6094	5292	2108	8501	9051	3958	8838
2759	4943	2975	8514	1515	1876	7959	7220	0822	1640	3725	6924	4528
6389	9762	5239	9815	5474	5026	7374	8715	7969	7814	1525	0883	1835
8208	2258	4738	2587	1588	1649	0784	5082	1700	3815	3374	9768	7364
1443	9452	4589	0664	0557	2592	2703	8909	7221	2702	3127	9118	5762
3755	4125	3570	0884	2089	8597	6986	2384	5149	4488	6030	7742	5873
2863	8495	5267	7149	5285	1292	1960	4448	7734	4750	6832	4428	2798
9292	4982	6128	6918	0285	3411	6879	4613	4578	9438	5336	8395	1937
8324	1720	9771	4326	8006	1604	3329	0246	8133	0347	0510	7148	7641
0618	5389	2989	4078	4195	2649	8569	5983	1222	2390	0784	4346	5285
2482	6416	7500	5263	2100	6627	2375	7007	1631	3400	4610	7035	5765
6105	4102	6273	0722	2126	2292	9386	5549	2992	9229	9211	2679	7000
2934	4708	3882	8857	4852	2029	6280	5240	2290	3770	9213	6119	3569
1527	3914	4161	5453	8144	3660	9621	0991	5646	9234	7972	1037	5856
8923	0538	4512	6850	8793	5274	7476	5589	7847	2105	3855	7633	3283
7406	9905	3646	2927	6435	5763	1612	5578	7506	4509	1805	9900	8502
9904	5788	3187	8941	8573	4864	7356	3675	3209	3404	6718	1383	7365
1587	3424	9227	0869	7333	7249	9625	1940	9784	3567	4709	4378	2160
0064	4532	1231	5122	7381	8664	3524	3252	5324	8688	0932	9153	9887
4044	3420	7658	1886	6903	8286	0158	8641	6594	2277	2748	2805	6822
8946	5176	0048	0768	0212	3306	0824	3192	7734	3747	6859	1761	0305
4483	4527	6024	2617	3242	6565	0285	1025	4780	7543	5423	6492	1333
8919	5795	7254	8613	1171	9449	6892	2362	1155	6032	5703	9799	7100
1108	4047	1272	2842	1158	1898	1695	0648	9893	8575	9675	1266	6125
9033	0196	5493	8054	1684	0917	7299	4556	2971	3106	7659	6007	8843
9459	8228	7963	2898	7113	7329	9616	2677	5113	8400	7514	2443	4677
1167	3825	5382	1048	8702	0769	7986	8398	4172	9176	4974	6175	9787
9101	0211	3412	9131	4471	4044	5176	9156	5759	0216	1619	5453	6504
1315	0594	0659	9393	0359	0374	2475	4334	0977	4802	4751	9408	3657
0324	3490	8183	2350	7268	1608	5663	4023	2375	0444	6510	2918	1134
0474	6303	6171	0095	1853	0662	9691	9082	4485	8321	3753	2893	0583
9790	4302	3008	6270	1353	5335	3988	6910	7714	1653	3008	6968	3684
6490	7696	2681	4337	5859	2580	1865	6492	4669	6842	5328	8959	2427
1212	1649	9697	3417	5412	3431	8666	6929	7938	4294	5405	0237	5264
3674	9517	1833	6360	7667	1133	9658	2282	0521	4582	9192	9475	9675
8046	0474	3180	1061	8206	2799	8250	4502	0322	1400	5390	5976	5552
5464	3816	1926	4185	8536	6993	3388	6917	7472	2050	3798	3001	2652
6011	0832	6044	6662	3281	4445	7505	4650	8999	3738	7694	5495	0945
0494	2317	2054	0976	0173	3432	1774	6927	5515	4509	1868	9239	7319
7682	5208	9683	0885	3649	6491	6876	6472	2190	3552	0932	5631	6294
0716	8560	0879	9460	2377	3895	6045	7279	7597	9136	4329	0022	6001

RANDOM SAMPLING NUMBERS -Contd.

27	28	29	30	31	32	33	34	35	36	37	38	39
3839	2399	8527	7616	9066	8081	1150	4032	7816	4624	6134	4140	8121
3340	2450	0917	0441	0415	2220	0713	9432	3204	6299	8200	5170	4185
2244	6399	9051	3394	6903	1677	5868	7330	2976	7800	4211	4373	7423
6588	6742	2387	8958	5093	8337	7940	9635	8303	8137	2410	3716	9153
1909	2373	2230	7711	9519	2552	0290	8330	5556	1079	8231	9808	1617
4228	0998	2092	5168	3984	6752	8804	2505	2635	1672	9160	4543	8112
9912	7797	1703	0593	9746	5794	1343	0627	3211	4343	4916	8058	8393
2534	8133	4074	6635	4542	0638	8394	7495	2748	3769	4148	2788	8516
5042	9047	3397	0227	1845	1904	3564	8557	7477	5312	2404	0969	3658
5736	5901	7503	9679	0720	5115	8791	1868	5379	2854	2927	5829	8553
9195	5696	3777	3600	4401	0319	5724	9255	9264	3990	3920	5634	6760
2993	6965	3537	0520	8818	3955	3977	5312	2828	8136	0500	8052	1517
8453	2823	5564	4312	1211	4962	8009	4174	2889	2734	8231	3289	1638
4034	4071	2914	4891	6648	4696	7336	8435	5131	5325	4521	9508	1678
5254	8883	1329	1694	0096	8682	2667	6610	9055	2370	3267	1835	1971
5395	0496	4209	7858	2680	5546	0287	3840	7900	6978	8813	6893	3992
2279	1472	0641	6426	9787	1575	4670	5677	3693	0009	7369	1814	5575
6822	9402	1128	9772	6799	0230	1735	3601	0380	3666	4560	6157	9816
9445	5604	6092	1388	0563	9742	6333	5691	0246	5304	8136	7625	2279
7269	0522	3086	8488	2678	7421	0110	2336	7266	8147	2851	5128	0854
0823	5961	4836	1714	6176	0576	1177	6096	9312	4716	8918	5100	2640
3697	6687	1091	4752	6592	4328	9012	6487	6111	5340	7352	1088	2064
0109	3442	5317	4379	7462	2681	5495	8336	2310	7293	0679	2736	3057
4677	8541	6294	0999	0555	8971	3041	4087	9826	2665	6642	6501	8396
7405	9208	8652	6009	0530	4245	3201	8953	6703	8591	6952	0571	6759
9428	4408	6025	9544	0277	9262	9391	9172	1110	0286	3954	5842	1917
4881	0296	0254	1796	6026	3032	0293	9937	9651	5991	0357	5481	6141
5106	5732	5697	3685	0327	4573	7846	6068	8350	9094	0824	8500	5071
0195	8558	7496	4868	2206	2897	0236	8963	6982	5980	3383	4945	1727
7304	9326	7021	0566	9092	6675	1099	0399	6490	3336	8361	8708	4884
4902	2358	7985	4468	3739	7304	8333	0186	8570	9185	4355	9833	1209
6927	8419	4749	0722	6075	6903	4394	4896	9169	5131	6122	7345	5740
8466	7966	8507	0159	9822	3946	1370	9962	2127	0784	4969	0120	4379
6183	7342	9080	4089	4308	8049	3846	2633	8090	9584	0263	1989	0751
5001	3438	0040	0134	6492	0242	3176	5976	2959	8118	4346	4338	7181
0085	6790	6650	8488	3894	9571	9787	2906	0503	7034	6954	9117	2444
5639	5895	0851	5393	6676	5184	4278	1435	0769	2956	6526	4957	3608
2896	6429	1562	6093	5024	9558	5376	3508	7237	2660	4330	5422	8128
2342	3643	6683	6378	5234	1785	0020	4634	1670	5932	0694	8554	3385
8570	1812	5224	4494	5820	3909	1724	6581	3450	8172	4732	8210	0575
7174	9145	0028	3026	6910	8457	0529	1947	2360	9783	7376	5101	4031
9410	2430	8821	6850	0101	5006	8593	8306	1665	6058	1855	1118	2347
6499	6489	8700	7847	1283	9076	2961	3716	1136	4947	1416	3595	7878
6137	4618	1466	6226	0092	6467	3527	1162	5496	9423	4901	2455	9671
0612	0495	7546	2631	4518	1717	8531	4945	1554	3642	4941	5844	2417
7101	6516	9055	4410	5552	6323	7217	5104	8732	7921	5589	9943	6947
5856	2487	5075	8582	7217	9977	4982	4072	9029	5644	7802	4189	1781
8576	2555	8335	5325	0068	1840	4134	0018	4252	2839	8796	2617	0466
4046	2589	2105	0679	5339	5351	6562	8251	1835	9237	4830	4257	8368
2645	0803	4145	4733	5748	1899	0352	3203	2375	5199	7606	3216	4817

RANDOM SAMPLING NUMBERS - ***Contd*.**

40	41	42	43	44	45	46	47	48	49	50	51	52
9132	7696	3881	0166	4993	4377	3819	5964	2259	4115	3826	1355	8765
3348	3851	9905	3598	5203	6659	7617	1496	1726	8091	5766	2929	9570
4454	4091	0798	3723	5762	8412	2327	8878	6772	7310	2407	5780	8218
0736	4453	3716	4378	1413	4280	1489	4991	2548	3598	8438	5403	6666
8576	3125	8572	3763	1152	0007	6062	3819	5204	5011	2489	7187	5023
7782	3435	5096	8487	6459	4298	1490	3407	2937	5278	8352	4809	0290
7002	3612	3129	9590	5053	5032	9899	5224	3099	8109	7923	3860	3825
9142	2551	8772	2001	9417	2262	0983	7629	8112	7269	8977	4196	4416
4950	7238	3216	0467	8273	2391	4912	3504	8974	9320	3895	3107	0587
6038	1720	6254	8973	8137	2978	9118	3679	4252	1870	6136	5898	0385
3738	7557	8817	4343	2509	2691	1109	6387	0604	0032	0124	8882	0567
5764	1347	1241	6734	5205	9508	4873	6132	6667	9311	7467	9739	6412
2232	7367	9470	9195	0297	2971	7794	6965	4320	4097	8126	2899	3200
5612	1602	0436	5012	3486	3405	0963	8423	4637	8535	2197	6521	6600
5177	4898	5343	0348	7424	1951	6009	8793	0126	6759	5329	6310	9239
1877	7365	2455	0787	0859	3654	7732	2044	1052	1392	2073	8979	6289
7895	2296	2898	8347	2432	5519	7365	3654	0104	8374	9582	5379	8163
5695	5726	3148	6124	4489	6749	3780	7223	3555	1415	0541	4308	0266
9627	4776	9214	9047	2639	7813	8653	9123	6076	6617	1759	8866	2438
8380	3180	3395	8600	1450	3846	4153	5088	7487	3910	1331	9637	3008
6019	9155	7338	5637	2472	3994	4773	3711	7533	5088	7451	3250	5355
6979	8370	6656	8787	5999	1559	1038	6361	3916	8727	2041	0252	8894
1391	2835	8595	0395	4194	0956	6215	5875	8608	5792	8931	5660	0174
1201	8691	4955	9920	4925	0210	9247	7940	9853	8508	9295	0877	7300
1570	2486	2654	8004	8232	2876	3716	6249	3835	9508	1576	1493	8933
7725	9071	4462	6788	0300	4626	8324	6429	1527	7936	6661	5619	0307
8553	1897	4368	6405	4273	8883	5939	7866	1027	9696	2491	9432	9815
0724	9582	3125	2483	1417	6715	0220	0158	2755	8805	4962	2058	8824
7225	4781	1956	5495	8325	8077	1735	2673	5153	4190	2522	1480	4141
9361	2550	2490	6738	0711	9348	5182	8760	3476	7313	8487	8666	3739
8950	3309	7193	9135	6829	8106	8454	2570	1467	5313	4974	3068	3359
3684	8782	7061	2936	8752	8897	7671	2399	9327	7207	5525	4777	6371
0724	9582	3125	2483	1417	6715	0220	0158	2755	8805	4962	2058	8824
7225	4781	1956	5495	8325	8077	1735	2673	5153	4190	2522	1480	4141
9361	2550	2490	6738	0711	9348	5182	8760	3476	7313	8487	8666	3739
2184	9870	4778	1617	5026	0213	0417	9613	6823	1400	5128	0879	8729
8662	9831	0572	8474	7181	6546	0248	6474	8093	6103	5353	0827	7420
4073	1795	3225	4457	0329	8119	3201	4199	5691	4526	9949	5914	2041
7609	3315	0205	8300	7428	6833	5008	6877	0278	6272	4563	0344	6355
5521	5621	7651	6108	0407	0564	6421	4669	2019	4189	5132	0193	3451
2058	6594	0334	8554	9897	9636	7343	7215	0248	5800	4343	7099	3349
8812	1920	8883	1636	3789	5319	3301	6211	9964	7561	2340	9939	6028
2845	1117	9197	8379	6881	7274	4253	3111	6815	4544	3439	1184	9931
6794	1373	0493	8403	3748	0598	6322	2219	1548	4960	4200	3594	0201
5497	5801	5388	0454	9052	0492	5624	1546	7587	5559	3286	4613	2412
2352	3173	2205	7611	1526	3647	7795	6949	4921	8369	0254	0967	4573
3555	9640	6939	5020	4902	8498	2089	9030	5213	9025	9965	1483	6793
9847	2964	6982	0630	0415	3475	3760	0530	7917	9078	4709	8258	7996
8901	4599	0078	5660	0063	7235	8185	1284	9564	4305	1309	7020	7214
9092	0829	2603	3384	5860	2144	8752	1532	0268	7348	1934	2765	4457

RANDOM SAMPLING NUMBERS -*Contd.*

53	54	55	56	57	58	59	60	61	62	63	64	65
4433	2352	1089	4025	9931	3648	6841	1514	6210	0043	1370	3994	8617
9193	7148	9385	8935	2039	9877	6952	5640	1329	4890	2699	9984	8544
4246	9410	6984	4389	4091	9547	1918	9272	7477	2722	7253	6157	1425
6974	8488	0052	0284	7232	4445	0005	5835	9964	7209	2208	0818	8980
5673	9439	5736	3547	4381	2536	8720	0274	7414	1322	2161	4297	6672
7370	4348	1501	4538	7753	1548	5662	2790	4164	2580	4738	4351	5782
6934	1336	5372	3817	8777	3539	8212	0324	8846	0680	9668	1304	4361
1592	0277	4677	2463	6917	7173	4767	3904	5238	6058	4592	3308	5952
4683	5146	7856	6498	0591	7063	0592	3227	9038	3931	7885	7812	6932
4206	0691	4936	4960	9453	9297	7052	3140	1107	7768	5199	8568	7989
5885	8772	7315	6556	5413	3472	8963	6826	0191	2113	6762	8535	2360
2584	0954	5098	9837	9034	9305	2162	9385	9586	2967	0308	0402	5440
1275	4094	0741	6856	4802	9749	6370	7070	9696	2284	4510	2988	3376
6801	0322	7357	3568	7934	2642	1297	7405	3344	3452	6248	9061	7772
6853	5926	1310	1895	8621	8815	6252	1877	8377	9051	5959	3944	3860
3210	1984	8726	5091	0379	7835	6603	8340	9415	0041	7263	2064	8792
1684	2251	0599	9403	5932	8313	9671	4711	0844	6737	4628	5079	0169
2391	4030	3442	6670	5735	5645	0242	6267	3508	2317	2103	0137	4388
2543	5631	0793	0975	6696	6875	9279	5735	5307	6696	8482	3392	0275
6793	2067	6390	8269	5959	2173	0743	9325	2021	3100	7568	3176	6672
8118	7800	7278	3325	1398	3303	7356	1130	8554	2933	4277	9447	1175
4970	7155	4658	6260	0428	9419	8721	8669	1641	2538	6355	9945	4550
4496	9543	4898	4831	0681	7703	7201	8034	5745	0255	5429	9893	2981
9022	1865	6954	4660	4409	5258	4715	2437	6781	5471	4297	0542	1768
4816	1573	5911	6227	3344	1340	1103	9529	9983	5046	5230	1180	3581
8897	4577	3272	0120	0780	9594	4972	7814	1010	0629	8617	2197	4364
4234	6700	5512	2588	6693	7878	3113	8241	9459	1738	3417	2340	6903
6933	4608	7360	9615	2408	1937	1091	4512	8406	2185	2383	6156	4449
0502	6622	7691	5544	3431	0172	6800	5742	2703	8901	6442	8912	6882
6440	4903	8197	7480	3283	1580	0386	4486	7554	8088	2801	1411	7899
1248	5345	2179	6154	5047	5825	8400	3516	5910	3159	7327	2280	4869
3110	1790	4335	7167	6303	4074	9440	2309	0115	6285	6896	2097	6823
8822	2268	2996	8730	3246	0034	8050	2418	3664	0755	4927	2363	0003
8680	6533	7390	0325	2211	9701	5092	1536	6148	6673	9191	1208	5772
5327	4637	3146	2587	0044	7946	4754	1336	4955	3156	7011	2364	8448
3798	1284	1143	5244	1611	7313	4137	3488	4744	8422	7660	4716	3896
2688	2754	6867	1165	5324	8103	5475	2450	7002	0842	3204	5203	2303
8552	5263	0423	1350	5079	3879	0621	8345	0345	7563	2904	2636	6920
8713	5342	1220	7022	0807	3013	0490	1353	4064	5179	8723	9685	1729
2104	1260	0602	3960	8955	2909	8777	4935	2170	7257	1614	1819	2564
6503	9397	8348	8003	6416	3975	0940	6973	1349	4031	0113	3939	6529
0085	3598	0656	4174	4620	8133	1643	7991	1426	7017	0466	7387	3266
3822	5411	9165	3022	4089	1290	6605	0015	0681	3092	6372	2072	6349
2193	6533	4051	9973	7066	3132	4583	0214	8177	8776	0581	9195	0494
5392	7469	4391	2143	2124	0232	1082	2741	4358	2822	1880	5731	8687
4635	4456	4281	4558	5815	2478	3956	8146	5288	2950	2264	5279	6683
0495	3901	7970	9721	8224	5840	9473	0788	6291	7117	5248	3328	3006
3296	5939	6745	0662	3172	6085	0726	4598	5452	2030	5885	8607	7318
1348	7072	2525	7077	9959	3389	8678	9631	7202	4012	8704	1845	6943
3132	3302	1895	1438	1820	5945	3172	7867	1622	7371	8596	8592	5692

RANDOM SAMPLING NUMBERS -***Contd.***

66	67	68	69	70	71	72	73	74	75	76	77	78
7735	8909	8431	5629	3250	2025	4369	3332	0003	3408	0384	2846	8719
5956	9003	1220	7639	6935	6854	4869	1102	7442	9950	8340	4926	7902
6706	6780	7353	7937	6003	7784	1985	8344	4992	3597	5700	8139	8660
1396	2120	0828	4725	7407	3013	2729	1211	4771	2958	9281	0268	1007
8349	5962	5593	6635	4833	8626	8455	7769	9359	1703	4007	9405	9249
7494	4758	5533	8713	0554	5717	3882	1285	3303	6576	8019	9713	5988
4269	6780	9259	7974	0731	6771	8733	5568	3786	3306	5642	4449	6212
8953	0194	3236	2923	8553	3768	2888	7127	2334	1975	6422	9562	3280
1438	5626	3457	2821	7566	6851	7991	2596	9634	1232	4460	2346	2562
5377	7607	3711	7415	6367	5316	5519	2688	2883	3162	5596	5498	2701
3534	7797	7909	0789	2004	4097	3817	6965	8274	6045	0492	0921	0454
8197	2110	2061	0030	9651	1812	0545	1950	7912	2571	5286	4356	8457
7702	6841	6488	8774	8316	9854	0062	9080	8947	4538	2493	0002	5030
7173	5649	6364	7136	3970	9462	5325	5103	2933	6231	4620	2198	8286
1797	9827	1311	8809	0857	4072	1384	8413	5110	8973	5070	4886	3324
0032	5773	8163	2347	6655	4542	4324	8361	8258	7948	5195	3343	2655
9300	3362	7987	7210	1165	2110	9568	6503	9345	6071	5588	4270	9464
9948	2209	2137	0227	3656	0256	6496	6710	2790	0147	7385	2204	4177
4921	8838	1855	7705	7399	2842	0357	1047	8104	4786	1506	6699	2908
2230	5610	5199	5772	8243	6905	0620	3685	9289	5352	6841	5356	3064
8170	4675	0002	5031	3669	6954	3994	6597	8724	8673	2770	8111	7667
0659	0821	3163	6713	2628	0968	3034	6064	9155	6535	9183	8713	9877
1653	5365	3125	1325	9800	3862	2062	9996	3958	9978	7086	2974	8746
6647	8825	1164	2152	6487	2915	8820	3780	9437	4797	7387	9711	6766
5504	6581	6949	3053	5762	4148	8188	1168	8263	3770	9158	7874	3213
0755	3838	8379	1661	5121	3714	1516	6685	0998	9810	8392	0656	0820
2575	0517	3665	1612	3963	5827	3341	0358	7151	1190	5373	6250	8981
6787	8769	3611	6468	6902	5562	1307	6068	5526	9617	7856	8633	5698
6491	5275	7435	3190	3674	5320	3441	7202	3938	1348	9189	7990	7658
4706	4754	7595	7010	5747	1092	4141	3377	9084	3196	3083	6614	3686
8827	3331	7386	0108	8253	8455	2548	1081	1015	6898	8548	6184	2056
4569	8261	0846	3435	5315	2400	9930	4586	6556	1803	6831	9934	7878
3164	7456	7868	8288	6304	9566	9312	4129	1842	6931	6142	8765	3220
6798	2250	6950	1636	4168	8181	2662	6800	4242	0260	1531	8753	1400
2198	9134	2835	1010	5350	0435	4148	3505	8283	5683	7302	3675	6354
6092	9407	9311	5459	9951	2105	7507	1645	6152	5771	3093	3310	5988
5279	3891	7760	2168	0288	1260	9399	8522	9773	3997	0941	6311	9449
2341	6462	7044	2881	5466	9051	9264	8091	4140	5596	7660	5586	0308
2742	7370	5076	2938	7440	8108	7559	5318	4915	5739	9416	0899	0792
7370	1105	3304	4053	6272	0665	1197	5284	5665	3328	8514	4657	4920
4326	1019	7539	2582	1926	4287	0063	8284	7749	4630	5742	6744	0782
0778	2763	0553	8274	8612	2266	4090	0056	8122	0244	7564	6701	5961
9092	7950	7404	2668	2128	9648	8059	2702	0506	2183	6255	6260	5695
9676	0718	3949	8369	7284	1913	3690	0084	0345	6103	7281	9416	9044
1276	0587	8549	2460	9246	8916	4360	5265	4509	8499	7038	5580	9748
6886	6877	7939	2654	9249	0108	8909	0379	6129	8654	2320	1117	9765
3874	2171	7729	4210	8249	2988	4366	7267	2986	9913	9532	1954	1035
9965	0124	0939	8725	0574	2265	0482	3598	3251	7757	0156	1132	6774
1709	4026	7805	9517	8993	2787	9271	4111	8495	4371	0672	9765	5857
7949	0737	3462	3589	2131	5837	5647	9464	7172	1836	0705	6012	8012

RANDOM SAMPLING NUMBERS- *Contd.*

79	80	81	82	83	84	85	86	87	88	89	90	91
6926	9815	0247	4369	5438	0492	9447	2184	9542	7255	7591	3488	1220
4396	2980	7314	8278	1489	1296	6955	3558	9902	9315	6343	1749	5232
9897	2653	0693	9581	2349	1020	9013	4204	3893	0189	5054	8445	5258
7971	9955	1051	0868	8469	2849	7416	9890	1679	3197	4526	4950	2002
0708	1044	1602	9053	7638	2695	0611	8350	6809	7977	6245	4918	8718
0788	3715	7319	5566	9868	6990	0324	3716	7421	3830	2871	1943	3445
3022	6362	0165	1307	7206	6918	0786	4219	2583	6487	7400	4052	1666
6139	0829	6953	9344	6983	0918	6932	0584	0729	1674	5828	4501	8231
8362	8165	7249	7145	6532	3484	6256	0865	8457	1631	8390	6794	5205
0037	8911	3295	5088	4576	5534	3357	7241	2630	4901	0970	9544	0139
1426	1414	3316	3002	2728	8792	0792	7176	8995	6619	6028	4781	4286
9434	4591	4222	8977	9826	3474	4254	5921	6082	1533	8538	6560	5230
6902	9139	5976	0466	9366	2473	5809	9517	0842	1329	5479	7753	9723
5664	6789	1709	4697	3964	0591	5642	0312	3267	8874	4162	9002	2984
3739	5124	9282	3363	0262	0812	1427	2369	3790	9593	3947	8995	1581
0648	4225	4345	6717	6667	3358	2090	6275	1527	1358	8309	2500	2480
0412	1097	5742	1570	4278	6747	9931	6119	4486	7774	4135	0367	0389
3869	5646	2897	0916	5934	1457	2401	1626	6554	4755	4656	9211	9862
7455	5849	3913	5339	4217	1415	1129	5055	4638	8154	3554	5475	0401
3492	6169	5986	4090	5219	0697	2576	8385	1555	1374	7174	5716	9468
1559	3064	4646	2980	7418	0827	6155	4507	1427	1298	3354	6125	8172
3196	2875	2717	0984	8035	8362	2896	7255	0004	7588	5715	7080	9714
3877	2841	1109	7014	7205	6802	1855	4622	9396	4114	4530	5544	7748
2212	0317	5050	5061	0358	6157	4553	9417	9663	7653	2396	1346	8557
2301	3528	1007	4773	5774	6591	4559	4003	2825	9787	1047	7135	7592
6339	2486	4869	9862	6070	9035	7327	0432	9278	4127	8186	5100	0215
4019	9918	7491	1017	5883	1207	9334	7042	9041	7559	8529	2721	6606
2738	6232	5786	2522	3805	0452	5340	3882	4785	0917	2808	7290	5752
6584	3424	3633	0746	8896	5892	6990	7860	4800	1126	7647	5534	2287
5784	3599	9450	5252	9735	0011	6498	7303	5965	8236	4778	3899	7066
0107	1465	0405	4930	3444	4140	3961	4969	7926	0203	5996	3991	8640
4113	5349	1168	8212	7466	1283	8009	4619	0526	1294	9590	2525	2755
7925	9159	3604	3017	8373	0383	4262	4599	6922	3342	1173	6034	0525
3896	2923	1201	8643	4458	8408	8040	7809	9149	1261	9517	5712	9638
1949	7450	1250	9078	6773	2003	0134	0960	4403	5338	7566	3291	3849
5108	4134	0805	3552	7236	1120	8938	5141	0064	1746	3029	1077	5995
3300	1054	7601	4057	9438	4506	9442	8057	0808	5120	2311	9080	5478
6354	3064	8348	3297	1162	8074	1473	6956	5871	4150	4175	6599	2149
3344	5600	5638	3482	8775	6611	8595	8602	0484	7715	7824	0967	6708
1405	2055	4716	5873	8281	3194	5373	8370	5730	2073	0830	0766	2255
2362	7075	8499	3072	9366	6314	6386	0799	3865	6099	2339	1486	2967
7789	1820	0711	4907	7863	0719	3622	3908	0361	5428	3285	9176	7726
2454	2841	3407	2344	6044	5984	3322	5862	1514	0363	5704	8573	8816
8473	2926	9184	8156	2051	3749	4731	8012	6883	4135	9419	2216	9429
1772	2987	1390	7451	5936	6016	9117	9232	3779	8952	3727	9620	8697
3507	5007	6166	4610	5648	9408	2132	4213	8508	3515	0424	8573	7778
2719	8844	3715	3116	9924	9668	0747	3329	2636	9671	9128	8186	2169
8100	8501	3067	0634	4802	6164	7164	0311	2781	5865	2672	4752	6529
4049	2795	5573	0458	1645	2737	1026	3055	0878	5826	4595	1016	5719
1856	7126	2603	6147	8303	3577	4056	2078	9970	4151	9538	3432	1172

RANDOM SAMPLING NUMBERS

92	93	94	95	96	97	98	99	100	101	102	103	104
2275	3026	6421	5733	0444	2955	0802	0412	8092	6572	3847	1768	8813
8121	8604	4696	1308	8672	2024	4935	4702	5453	9243	6137	4686	0623
5913	5217	8628	5582	0721	0338	2841	0931	3504	3413	9237	0220	3227
3314	5431	4127	3722	6948	2125	5888	5157	5659	9822	4723	1898	9679
3357	0602	1585	3289	3165	9689	6166	0513	1834	8526	3064	0602	9909
9558	7977	4451	8478	2417	7140	3370	6025	7313	7900	0389	8093	2306
8169	6690	5265	8825	8124	0691	7306	6222	5879	4919	2734	5937	8623
9353	2191	2772	0671	8420	4133	7164	5874	8780	6198	8274	3970	1248
2218	7209	8437	4842	2337	2187	1630	0956	8270	0111	2544	3765	4360
5362	1495	4601	3028	2903	5074	2694	6780	9694	7076	2969	7091	6344
1699	7885	9736	0684	3674	9065	2012	1217	5084	4607	4833	6315	3636
0594	4305	1833	3965	7747	5820	3170	9652	9916	7766	9927	0409	9387
4737	1742	9446	0750	3431	1091	6757	4895	1584	6628	5913	4359	8250
2436	1092	7663	7825	1592	3649	3709	1231	3950	8186	2885	0346	3028
3809	3828	9025	2548	7013	7971	2172	0347	1648	7196	1539	3409	5135
3738	0951	9591	0213	1868	6950	2606	0229	8737	5870	7033	6030	0967
5018	6346	6374	0387	3697	2555	0557	2503	6858	9212	9203	2213	0623
1124	3871	4118	1840	3465	2455	0138	4844	4507	3338	6355	3709	2547
7457	9906	3929	2732	3777	7742	9719	6379	2108	4469	6457	2192	3655
0507	4746	0544	4262	9410	4486	6897	0769	2516	0081	2538	2938	1149
6188	6632	9504	4764	5080	5833	5737	3408	3329	4779	7652	7762	2661
4878	4595	4240	6333	8845	0623	0965	1136	3566	6098	1924	4548	8560
9633	8811	1047	3646	9592	3918	9148	9173	9309	4476	9595	5839	2871
8547	9302	8829	9841	0763	7963	8675	9582	7267	8857	6153	6126	9298
7754	4216	4170	5726	9787	5218	6064	2866	9939	8248	0481	6936	2167
3771	2703	3846	2519	4282	5451	6533	3266	8879	9486	0900	7869	9465
3221	9688	6370	8440	2887	7300	5613	5072	8946	1456	3088	6551	7606
3989	0296	0569	2004	6654	2093	4338	7853	6657	5728	9741	2488	1831
7348	5842	1079	8295	6981	2013	7736	1529	5715	5126	2273	9315	6055
2632	5711	7188	9428	8853	0294	7085	1441	1229	7644	7734	3300	3832
9199	1332	2523	2533	0444	7354	8140	6861	2279	2150	0145	3290	4965
7331	8820	0047	0063	2444	6175	4353	5837	3070	0408	4181	7834	8399
1081	1241	0734	7804	8878	6185	6176	2085	1090	0162	2591	8657	2441
5996	3580	0833	3340	9132	9004	1968	0308	6267	9872	8549	4789	5619
2396	1392	7855	4212	6366	7689	1448	0340	1554	9011	6610	4241	8176
0495	7170	6654	4721	1578	4263	3144	7474	1841	1996	1179	7579	1945
9946	5935	4432	9131	9225	3972	4962	6525	4943	0064	4257	3649	5393
5826	0041	4791	9114	1735	2012	3008	1530	0530	1202	0047	8429	8620
7781	7993	2193	5640	8735	3175	6938	3148	1860	2914	9261	9060	4432
4088	5580	1144	6415	2802	3611	7363	4576	1816	3545	0237	1259	9688
2236	2780	5371	8612	9855	2905	8793	2209	8080	9913	8754	0669	9897
0114	2581	7349	2058	8583	1724	2192	8428	3018	9337	9171	5880	9089
9840	1490	9553	8628	7262	2884	3743	5431	1902	6008	2300	4628	0869
8234	9906	6609	6103	9234	2359	5577	0566	5705	2647	8348	1577	8568
9256	9469	3387	5751	9287	2044	6719	4578	3855	1146	9793	2150	3268
6234	3412	6148	5969	9422	2718	0419	4297	6037	3562	2601	3977	5254
8259	5053	9492	0181	1824	5440	8753	1723	1472	9922	6277	1915	0255
7900	7868	3054	4218	9227	8198	1799	0852	8645	4894	0269	7211	5378
4647	7558	1853	9463	9968	3738	7259	6840	6923	5092	0016	9362	9289
4472	0783	8275	8114	4258	9996	4488	1528	3087	0581	2929	1491	1534

LIST OF RANDOM NUMBERS TO BE USED FOR LOCATING PLOTS
LIST OF ONE DIGIT RANDOM NUMBERS

Columns:-																					
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*
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2	7	0	7	3	6	0	7	5	1	2	4	6	1	9	9	9	7	3	1	1	8
1	3	5	5	3	8	5	8	5	9	8	8	6	7	0	0	3	7	2	6	7	1
5	7	1	2	1	0	1	4	2	1	8	8	6	5	2	2	4	2	8	6	7	3
0	6	1	8	4	4	3	2	5	3	2	3	0	9	2	7	8	5	0	0	9	4
8	7	3	5	2	0	9	6	4	3	8	4	6	7	4	2	9	6	3	7	2	7
2	1	7	6	3	3	5	0	2	5	8	3	3	0	8	7	8	6	1	0	4	8
1	2	8	6	7	3	5	8	0	7	4	4	1	7	5	5	7	3	9	5	2	5
1	5	5	1	0	0	1	3	4	2	9	9	3	2	0	0	8	2	8	0	0	4
9	0	5	2	8	4	7	7	2	7	0	8	1	3	1	3	7	5	6	9	2	9
0	6	7	6	5	0	0	3	1	0	5	5	2	6	7	2	5	1	9	2	7	5
2	0	1	4	8	5	8	8	4	5	1	0	2	3	8	1	7	0	5	0	0	3
3	2	9	8	9	4	0	7	7	2	9	3	2	8	3	4	3	0	5	4	1	4
8	0	2	2	0	2	5	3	5	3	8	6	4	0	6	6	8	9	2	0	8	7
5	4	4	2	0	6	8	7	9	8	3	5	1	7	3	1	8	8	9	2	2	9
1	7	7	6	3	7	1	3	0	4	0	7	0	0	8	8	3	8	7	9	3	1
7	0	3	3	2	4	0	3	5	4	9	7	2	4	3	3	9	3	4	8	6	6
0	4	4	3	1	8	6	6	7	9	9	4	9	7	7	2	7	8	0	5	7	3
1	2	7	2	0	7	3	4	4	5	9	9	6	1	9	9	1	3	9	5	0	9
5	2	8	5	6	6	6	0	4	4	3	8	5	7	0	0	4	5	0	5	0	9
0	4	3	3	4	6	0	9	5	2	6	8	5	0	4	2	4	2	4	6	7	7
1	3	5	8	1	8	2	4	7	6	1	5	5	8	2	7	7	4	4	7	6	2
9	6	4	6	9	2	4	2	4	5	9	7	3	2	8	5	3	8	2	7	5	7
1	0	4	5	6	5	0	4	2	6	1	1	1	2	1	8	7	7	3	4	9	6
3	4	2	5	2	0	5	7	2	7	4	0	5	1	7	2	7	5	9	5	4	1
6	0	4	7	2	1	2	9	6	8	0	2	5	4	6	7	0	2	6	5	5	4
7	6	7	0	9	0	3	0	8	6	3	8	3	9	4	7	4	8	2	5	8	7
1	6	9	2	5	3	5	6	1	6	0	2	7	6	3	9	9	2	2	5	0	4
4	0	0	1	7	4	9	1	6	2	4	8	8	6	7	4	8	3	3	1	2	7
0	0	5	2	4	3	4	8	8	5	2	7	8	4	6	4	5	9	7	9	4	9

LIST OF RANDOM NUMBERS TO BE USED FOR LOCATING PLOTS- Contd.
LIST OF TWO DIGIT RANDOM NUMBERS (Page I)

Columns															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
51	51	00	83	63	22	51	39	65	36	63	70	77	45	85	50
98	97	87	64	81	07	83	73	71	98	16	04	29	18	94	51
30	79	20	69	22	40	98	72	20	56	20	11	72	65	71	08
81	69	40	23	72	51	39	75	17	26	99	76	89	37	20	70
90	00	73	96	53	97	86	37	48	60	82	29	81	30	15	39
46	15	38	26	61	70	04	68	08	02	80	72	83	75	46	30
99	05	48	67	26	43	18	14	23	98	61	67	70	52	85	01
98	35	55	03	36	67	68	49	08	96	21	44	25	27	99	41
11	53	44	10	13	85	57	78	37	06	08	43	63	61	62	42
06	71	95	06	79	88	54	37	21	34	17	68	86	96	83	23
83	45	19	99	70	90	00	14	29	09	34	04	87	83	07	55
49	90	65	97	38	20	46	68	43	28	06	36	49	52	83	51
39	84	51	67	11	52	49	10	43	67	29	70	80	62	80	03
13	17	17	95	70	45	80	44	38	88	39	54	86	97	37	44
13	74	63	52	52	01	41	90	59	59	19	51	85	39	52	85
68	93	60	61	97	22	61	41	47	10	25	62	97	05	31	03
01	07	98	99	46	50	47	91	94	14	63	19	75	89	11	47
74	97	76	38	03	29	63	80	06	54	18	66	09	18	94	06
19	33	53	05	70	35	30	67	72	77	63	48	84	08	31	55
43	70	02	87	40	41	45	59	40	42	13	27	79	26	88	86
95	80	35	41	97	35	33	05	90	35	89	95	01	61	16	96
82	15	94	51	33	41	67	44	43	80	69	98	46	68	05	14
65	31	91	51	80	32	44	61	81	31	96	82	00	57	25	60
85	23	65	09	29	75	63	42	88	70	10	05	24	89	65	63
65	79	20	71	53	20	25	77	94	30	05	39	28	10	99	00
81	06	01	82	77	45	12	78	83	19	76	16	94	11	63	84
00	52	53	43	37	15	26	37	79	59	61	81	43	63	64	61
50	28	11	39	03	34	25	91	43	05	96	47	55	78	99	95
53	32	40	36	40	96	76	84	97	77	72	73	09	62	06	65
69	84	99	63	22	32	98	87	41	60	76	83	44	88	96	07

LIST OF RANDOM NUMBERS TO BE USED FOR LOCATING PLOTS- Contd.
LIST OF TWO DIGIT RANDOM NUMBERS (Page 2)

Columns															
17	***18***	***19***	***20***	***21***	***22***	***23***	***24***	***25***	***26***	***27***	***28***	***29***	***30***	***31***	***32***
65	87	08	13	50	63	04	23	25	47	51	91	13	52	62	24
43	65	42	78	66	28	55	80	47	46	41	90	08	55	98	78
62	60	53	51	57	32	22	27	12	72	72	27	77	44	67	32
54	96	72	66	86	65	64	60	56	59	75	36	75	46	44	33
46	96	86	19	83	52	47	53	65	00	51	93	51	30	80	05
18	08	51	51	78	57	26	17	34	87	96	23	95	89	99	93
13	37	00	79	68	96	26	60	70	39	83	66	56	62	03	55
40	25	24	73	52	93	70	50	48	21	47	74	63	17	27	27
90	65	77	63	99	25	69	02	09	04	03	35	78	19	79	95
53	09	48	86	28	30	02	35	71	30	32	06	47	93	74	21
40	69	80	97	96	47	59	97	56	33	24	17	36	17	18	16
96	06	68	93	41	69	96	07	97	50	81	79	59	42	37	13
07	76	21	40	24	74	36	42	40	33	04	46	24	35	63	02
27	78	37	06	06	16	25	98	17	78	80	86	85	26	41	77
44	66	88	97	81	26	03	89	39	46	67	21	17	98	10	39
58	91	63	65	99	59	97	84	90	14	79	61	55	56	16	88
00	97	26	16	91	21	32	41	60	22	66	72	17	31	85	83
00	51	72	62	03	89	26	32	35	27	99	18	15	78	12	03
15	00	41	92	25	73	40	38	37	11	05	75	16	98	81	99
30	92	30	45	51	94	60	04	00	84	14	36	37	95	66	39
19	94	91	67	48	57	10	25	19	64	82	84	62	74	29	92
10	70	49	92	05	12	07	23	02	41	46	04	44	31	52	43
23	13	67	95	07	76	30	55	85	66	96	28	28	30	62	58
63	71	54	50	06	44	76	68	45	19	69	59	35	14	82	56
19	29	56	23	27	19	03	69	31	46	29	85	18	88	26	95
39	79	11	28	94	15	52	37	31	61	28	98	94	61	47	03
86	57	77	55	33	62	02	66	42	19	24	94	13	13	38	69
51	26	35	96	29	00	45	33	65	78	21	35	91	59	11	38
07	21	02	84	48	51	97	76	32	06	19	35	22	95	30	19
86	33	49	90	21	60	74	43	33	42	02	59	20	39	84	95

LIST OF RANDOM NUMBERS TO BE USED FOR LOCATING PLOTS- Contd.
LIST OF THREE- DIGIT RANDOM NUMBERS (Page I)

Columns											
1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***
642	807	270	546	029	835	828	386	010	216	322	045
790	186	608	897	265	257	276	134	111	914	930	921
435	410	099	205	689	786	313	094	883	382	695	654
218	345	226	433	905	298	385	904	803	854	968	739
263	626	225	267	531	617	134	416	101	081	503	908
296	340	928	403	526	048	138	609	682	807	331	986
835	883	273	307	700	227	101	762	243	049	471	774
058	569	858	422	469	850	647	050	958	217	564	686
452	341	221	191	226	645	614	734	201	633	887	868
757	049	479	348	407	575	377	095	239	675	527	886
149	322	243	302	047	427	832	247	827	331	045	500
639	252	212	801	325	032	719	795	702	411	414	913
648	047	384	924	748	096	704	782	188	117	519	249
573	469	233	958	782	058	134	047	833	897	686	154
879	632	569	615	352	706	787	428	114	305	629	806
676	183	092	227	221	143	760	061	915	362	366	778
235	417	572	035	884	979	255	034	163	387	717	660
749	782	410	000	437	057	074	404	742	573	618	017
364	969	700	077	762	551	646	702	616	517	361	377
406	697	651	823	196	747	742	202	473	049	634	182
749	604	596	495	370	532	952	843	214	125	162	641
355	217	237	436	308	679	812	164	651	367	825	191
392	184	954	851	986	202	732	640	447	515	829	158
627	816	252	418	390	869	332	852	772	438	864	281
709	349	671	505	855	905	549	550	489	101	527	041
876	219	495	418	943	864	864	424	200	164	054	452
687	529	938	822	641	033	948	299	058	732	974	113
836	884	465	379	779	348	217	195	359	232	948	907
262	484	430	807	965	329	181	438	896	614	551	306
406	292	730	137	235	154	714	114	506	375	139	077

LIST OF RANDOM NUMBERS TO BE USED FOR LOCATING PLOTS- Concld.
LIST OF THREE- DIGIT RANDOM NUMBERS (Page 2)

Columns											
13	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*
288	302	957	018	109	053	044	058	849	285	898	732
965	943	462	554	146	318	313	540	090	553	340	096
870	654	605	967	968	085	370	252	657	094	698	056
813	728	351	266	619	151	079	473	763	886	097	893
506	662	573	866	835	785	689	529	992	283	964	416
304	855	222	564	247	726	629	370	569	002	759	996
232	804	271	605	536	173	607	504	020	357	975	079
547	746	272	659	500	487	039	821	904	130	633	750
579	419	722	753	519	962	836	477	033	320	248	817
113	008	777	675	351	395	656	463	578	647	736	959
526	559	446	464	308	899	620	172	197	937	171	423
224	878	732	433	005	993	355	727	995	421	816	713
199	107	231	637	192	397	865	512	072	863	904	818
491	049	367	154	956	911	777	635	102	349	675	392
674	920	950	500	232	289	553	962	844	902	272	428
857	512	776	644	719	415	362	900	851	169	852	504
102	072	305	756	036	523	026	453	977	744	132	319
519	302	585	845	931	731	642	365	632	333	831	719
648	414	669	196	462	612	192	781	061	420	943	216
284	604	628	959	985	898	494	235	935	259	394	334
627	443	283	351	188	956	131	915	229	203	877	369
429	152	062	482	826	147	338	911	530	984	319	317
922	430	588	568	966	031	699	384	192	956	384	030
461	744	365	022	401	067	667	423	957	158	754	211
039	060	686	065	021	808	697	413	744	220	369	155
122	309	242	226	403	441	624	875	320	402	098	046
486	341	451	395	054	268	134	740	902	999	108	084
494	983	308	078	800	884	383	530	025	978	343	269
631	946	604	987	264	596	101	084	367	788	322	601
507	294	628	614	385	914	324	632	069	382	626	724

After the filled in schedules of different crops are received from the District Statistical concerned, the conversion ratio from green to dry produce is estimated based on the following formula:

1. **Rice:** $\frac{\text{Weight of the dry grain x 100 x 400 x 62.5}}{\text{Weight of the un-dried grain x 10000}}$
   (the formula is applicable for Winter Paddy, Autumn Paddy, Spring Paddy and Jhum Paddy)

2. **Maize:** $\frac{\text{Weight of the dried grain x 400}}{\text{No. of cobs x 10000}}$

3. **Jute:** $\frac{\text{Weight of the dry fiber x 400}}{\text{Total weight of the bundles}}$

4. **Wheat:** $\frac{\text{Weight of the dried grain x 400}}{\text{Weight of the un-dried grain}}$

5. **Rapeseed & Mustard:** $\frac{\text{Weight of the dried seed x 400}}{\text{Weight of the un-dried seed}}$

After arriving at the conversion ratio of different crops, the average yield (in kg) per hectare of different crops are estimated based on the following formula:

1. <u>Format/Formula for calculation of average yield per hectare on Paddy, Rapeseed & Mustard, Wheat and Jute in respect of the Dev. Blocks is furnished below:</u>

(Example for calculation of the average yield in kg. per hectare for one Dev. Block having 10 sample villages for any of the above crops)

Name of the Dev. Block: _____

Sl. No	Name of the village	1st/2nd Expt.	Conversion from paddy to rice (ratio of green to dried)	Yield of each plot (Kgs)	Average yield (kgs) of each exptl. plot	Average yield of each village (kg/hect)	Area under crop in each village	Total production in each village	Reason for shortfall
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
			Value derived from driage	*Value from schedules*	*Col 4 x 5*	*Average of 1st + 2nd Expt. (col.6/2)*	*Value from the schedule*	*Col. (7 x 8)/1000*	*From schedule*
1	Village –A	1st Expt.	222	10	2220				
		2nd Expt.	222	8.5	1887	2054	100	205	
2	Village –B	1st Expt.	222	7	1554				
		2nd Expt.	222	9	1998	1776	250	444	
3	Village –C	1st Expt.	222	6.7	1487				
		2nd Expt.	222	11	2442	1965	36	71	
4	Village –D	1st Expt.	222	5	1110				
		2nd Expt.	222	7.3	1621	1366	25	34	
5	Village –E	1st Expt.	222	4.7	932				
		2nd Expt.	222	8.5	1887	1410	18	25	
6	Village- F	1st Expt.	222	7	1554				
		2nd Expt.	222	9	1998	1776	36	64	
7	Village -G	1st Expt.	222	6.7	1487				
		2nd Expt.	222	11	2442	1965	75	147	
8	Village –H	1st Expt.	222	5	1110				
		2nd Expt.	222	7.3	1621	1366	86	117	
9	Village- I	1st Expt.	222	4.2	932				
		2nd Expt.	222	7.3	1621	1277	74	94	
10	Village – J	1st Expt.	222	4.2	932				
		2nd Expt.	222	4.2	932	932	92	86	
Total in the Block							**792**	**1287**	
Average yield in kg. per hectare					**1625**				

N.B.: Average yield in kg. per hectare = Total production (in M.T.)/total area of the Block (in hectare)

Example of how the conversion ratio/factor from un-dried to dried produce is estimated:

Crop	Particulars	Village - A		Village – B		Total	Conversion ratio/factor
		Expt.-I	Expt. - II	Expt.-I	Expt. - II		
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Paddy	Dry weight	1800	1750	1700	1850	7100	
	Un-dried weight	2000	2000	2000	2000	8000	**222**

Example for Calculation of average yield in kg. per hectare in respect of the District is as per the format furnished below:

Sl. No	Name of the Dev. Block	No. of Expts. conducted	Final yield of the Dev. Block (Kg/hect)	Area under crop in the Block	Total production of the Dev. Block (M.T.)	Remarks
1	*2*	*3*	*4*	*5*	*6*	*7*
1	Betasing	10	1625	792	1287	
2	Zikzak	10	2450	1020	2499	
Total in the District		**20**		**1812**	**4384**	
Average yield in kg. per hect. In the District			**2419**			

Format for calculation of average yield and total production of Maize in the Dev. Block

Sl. No	Name of the village	1st/2nd Expt.	Ratio from green to dry	No. of cobs in the exptl. plot	Average yield of each exptl. (kg/hect)	Average yield of each village (kg/hect)	Area under crop in each villages (Hect)	Total production in each village (M.T.)	Reason for shortfall for yield rate
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
			Value derived from the driage	*Value from the schedule*	*Cols. 4x5*	*Av. of 1st +2nd expts. from col. 6*	*Value form schedule*	*Col. 7x8/1000*	
1	Village –A	1st Expt.							
		2nd Expt.							
2	Village –B	1st Expt.							
		2nd Expt.							
3	Village –C	1st Expt.							
		2nd Expt.							
4	Village –D	1st Expt.							
		2nd Expt.							
		1st Expt.							
Total in the Block									

Format for calculation of average yield and total production of Cotton in the Dev. Block

Name of the Dev. Block : _____

Sl. No	Name of the Dev. Block	1st/2nd Expt.	Yield of the expt. plot (unginned) in kg	Average yield of exptl. plot	Average yield in village (kg/hect)	Area under crop in each village	Total production in each village	Reason for shortfall for yield rate
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
			Value derived from the driage	*Col. 4x400*	*Average of 1st + 2nd Expt. from col. 5*	*Area under crop in the village*	*Total production in each village*	*Reason for shortfall for yield rate etc.*
1		1st Expt.						
		2nd Expt.						
2		1st Expt.						
		2nd Expt.						
3		1st Expt.						
		2nd Expt.						
Total in the Dev. Block								

Notified area-wise data of cultivated area and actual yield

Name of the Dev. Block: _____ **Season:** ***Kharif/Rabi***

Sl. No	Name of the village	1st / 2nd Expt.	Av. distance between two	Length			Breadth			Total area of each plot	Yield of each exptl. plot (in Kg)	Final av. yield of each Exptl. plot (in kg)	Final av. yield of each village (in kg.)	Area under crop in each village	Total production (in M.T.)	Reason for shortfall of av. yield
				Spacing	Length	Total	Spacing	Length	Total							
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
			Value from schedule	Col. 4/2	Value from schedule	Cols. 5 + 6	Col. 4/2	Value from schedule	Cols. 8 + 9	Col. 7 x 10	Value from schedule	Col. (12 x 1000)/col. 11	Av. of 1st +2nd Expts. from col. 10	Value from schedule	Col. (14 x 1000) / col. 15	From the schedule (if any)
1																
2																
3																
Total																

Notified area-wise data of cultivated area and actual yield (Example given in the format for reference):

Crop: _____ **State: Meghalaya** **Season: Kharif/Rabi**

Sl. No	Name of the District	Notified area sl. No	Notified area (Dev. Block)	Cultivated area	No. of Crop Cutting Experiments		Actual yield (kg/hect)	Remarks
					Planned	Cnducted		
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1	East Garo Hills	1	Songsak	29	20	20	1270	
		2	D. Rongjeng	69	20	20	1200	*Weighted average*
		3	Samanda	15	20	20	1315	
District average							**1260**	
2	North Garo Hills	1	Resubelpara					
		2	Kharkutta					
District average								
3								
4								
5								
6								
District average								
State average								

Format used for Driage Experiment of different crops

Crop Estimation Survey on _____ for the year _____
Form 1/7 (A) – Central Driage Experiment
District _____

Name of the Dev. Block	Name of the village	Experiment No.	Date of harvesting	Qty. taken for driage Expt.	Particulars of experiments										Date of final weight/measure	Final weight of dry grain	Supervised by whom	Remarks
					Date	Weight	Date	Weight	Date	Weight	Date	Weight	Date	Weight				
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*

Name of the recorder _____

Signature _____

Date _____

Signature of the District Statistical Officer

Date _____

A NOTE ON THE SAMPLING METHODOLOGY FOR ESTIMATION OF AREA AND PRODUCTION OF VEGETABLE CROPS.

The survey approach for estimation of area and production of vegetable crops is somewhat more complex due to special feature of cultivation of these crops. Some of these features are as follows:

i) The vegetables are short duration crops and their duration varies considerably from one vegetable to the other

ii) Harvesting of vegetables involves a number of pickings

iii) Vegetable cultivation is more or less a continuous process with various operations like sowing, harvesting, etc. being done simultaneously in different fields of a village.

iv) Vegetables are highly sensitive crops and this normally adds to the variability in the yield rates of the crops.

It is also realized that due to perishable nature of the vegetable crops, production depends on availability of marketing facilities in the area. This is why cultivation of vegetables is normally concentrated around bigger towns and cities. Accordingly, the methodology for estimation of area and production of vegetable crops has been developed at the district level in different surveys conducted so far in various states.

The sampling design for surveys for estimation of area and production of vegetables is described below:-

Sampling design:-

The sampling design is a stratified multistage random sampling. Taluks or equivalent areas may be taken as main strata. Further, since area under vegetables may vary considerably from one village to another in a taluk, sub- stratification may be done on the basis of village-wise area under vegetables. For this purpose 3 to 4 substrata with equal area under vegetables may be formed. The data figures may be available in revenue records. If not available, then a preliminary survey may be conducted to obtain village wise area under vegetables. Within the strata, clusters of three villages may be taken as primary sampling units. For determining the extent of cultivation, a sampling fraction of about 20% may be used for selection of clusters of villages. The allocation of clusters of villages to different strata may be done in proportion to area under vegetables. The allocated number of clusters in different strata may be selected with simple random sampling without replacement (SRSWOR). For yield study, 50% of the clusters selected for area may be retained and fields growing vegetables may be selected in these clusters.

The selected clusters of villages may be completely enumerated for area under vegetables. Vegetables being short duration crops, one time enumeration in a year may not be meaningful. To account for the short duration of crops and early and late varieties, a year may be divided into four periods of three months each. The area enumeration may be done in the beginning of each period. This will also provide a frame of vegetable fields for estimation of yield rates. For estimation of production, 6 to 8 fields of each important vegetable may be selected in each of the clusters selected for yield study. In each of the selected fields, a randomly located plot of 5m x 5m may be demarcated and observed for all the pickings in the respective periods. The yield of a vegetable for a selected field is obtained as the aggregate of all pickings in the period obtained from the c. c. plot. The average yield of the vegetable for the village is obtained as a simple mean of field wise yield and when multiplied by the area under vegetable in the village gives the vegetable production in the village. In this way the production for each period may be estimated separately. The average yield is then obtained from the estimated production and the area under a vegetable.

This sampling design is likely to provide estimates of average yield with less than 5 % standard error and the area and production with less than 10 % standard error for important vegetable crops at the district level.

ESTIMATION PROCEDURE FOR

Estimation of area and production of vegetables crops in a district:-

The following notations will be used in explaining the formulae applied for obtaining the estimates and their variance:-

N = Total number of primary sampling units (psu's) in the rural areas of Delhi.

N_h = Total number of psu's in the h^{th} stratum.

A^t = Area under t^{th} vegetable crop in the tract.

$A^t_{h,}$ = Area under t^{th} vegetable crop in the h^{th} stratum.

$A^t_{h,i}$ =Area under t^{th} vegetable crop in the i^{th} psu of h^{th} stratum.

$A^{t.p}_{h.i}$ = Area under t^{th} vegetable crop in i^{th} psu of h^{th} stratum to be harvested during p^{th} period.

n = Number of psu's selected in the survey.

n_h = Number of psu's selected from h^{th} stratum.

$Y^{t.p}_{h.i.j}$ = Yield harvested from j^{th} plot of standard size having t^{th} vegetable crop in i^{th} psu of the h^{th} stratum during p^{th} period.

$$Y_{h,i}^{t,p} = \frac{1}{m}\sum_{j=1}^{m} y_{h,i,j}^{t,p} = \quad Average\ yield\ of\ i^{th}\ psu\ in\ p^{th}\ period, where\ m\ is\ the\ number\ of\ fields\ selecteed for\ each\ vegetable\ ccrop\ in\ a\ psu.$$

Estimate of area and its estimate of variance:-

The estimate of area under t^{th} crop in h^{th} stratum is given by:

$$\frac{N_h}{n_h}\sum_{i=I}^{n_h} A_{h,i}^{t} = N_h A_h^t$$

Estimate of variance of A_h^t is given by:-

$$\acute{V}(A_h^t) = \frac{N_h(N_h - n_h)}{n_h(n_h - I)}\sum_{i=I}^{n_h}(A_{h,i}^t - A_h^t)^2$$

Estimate of total production and average yield per hectare with their estimates of variance for t^{th} crop in h^{th} stratum.

(i) Total production in i^{th} village during p^{th} period

= 400 x $\acute{Y}_{h.i}^{t.p}$ x $A_{h.i}^{t.p}$

(ii) Total production in i^{th} village during the year

$$\hat{Y}_{h,i}^{t} = 400 \times \sum_{p=1}^{6} y_{h,i}^{t,p} \times A_{h,i}^{t,p}$$

Total production estimated for t^{th} crop in h^{th} stratum is given by

$$\acute{Y}_h^t = \frac{N_h}{n_h}\sum_{i=1}^{n_h} \acute{Y}_{h.i}^{t}$$

(iii) An estimate of variance of $\acute{Y}_h^t$ is approximately is given by:

$$\mathrm{v}\left(\widehat{\mathrm{Y}}_{\mathrm{h}}^{\mathrm{t}}\right) = \frac{N_h(N_h - n_h)}{n_h(n_h - 1)} \sum_{i=1}^{n_h} \left(\hat{Y}_{h,i}^t - \frac{\hat{Y}_h^t}{N_h}\right)^2$$

Assuming that second component in the variance estimate due to variation between fields within is negligible.

Average yield of t[th] crop in h[th] stratum is given by:

$$\hat{Y}_h^t = \frac{\sum_{i=I}^{n_h} \hat{Y}_{h,i}^t}{\sum_{i=I}^{n_h} A_{h,i}^t}$$

An appropriate estimate of variance of $\acute{\mathrm{Y}}_{\boldsymbol{h}}^{\boldsymbol{t}}$ is given by

$$\mathrm{v}\left(\hat{\mathrm{y}}_{\mathrm{h}}^{\mathrm{t}}\right) = \frac{N_h(N_h - n_h)}{(n_h - I)n_h\left(\hat{A}_h^t\right)^2}\left[\sum_{i=L}^{n_h}\left(\hat{Y}_{h,i}^t\right)^2 - 2\hat{y}_h^t \sum_{i=I}^{n_h} \hat{Y}_{h,i}^t \times A_{h,i}^t + (\hat{y}_h^t)^2 \sum_{i=I}^{n_h}\left(A_{h,i}^t\right)^2\right]$$

The estimate of total production and area for each vegetable crop for the entire region under survey could be obtained by taking summation over tall the strata. Similarly, the estimate of variances could be obtained by taking summation of the corresponding estimates of variances over all the strata.

The estimate of average yield $(\overline{\boldsymbol{Y}}^{\boldsymbol{t}})$ of t[th] crop pooled over all the strata will be given by:

$$\left(\bar{Y}^t = \frac{\sum_{h=I}^{k} \acute{\mathrm{Y}}_h^t}{\sum_{h=I}^{k} \grave{\mathrm{A}}_h^t}\right)$$

Where k is the number of strata into which the population has been divided. Also an approximate of variance of $\bar{Y}^t$ can be obtained by a formula of variance of combined ratio estimate.

$$v(\hat{y}^t) = \frac{I}{\sum_{h=I}^{k} \hat{A}_h^t}\left(\sum_{h=I}^{k}\left[v\left(\hat{Y}_h^t\right) - 2\hat{y}^t cov\left(\hat{y}_{h,}^t \hat{A}_h^t\right) + (\hat{y}^t)^2 v\left(\hat{A}_h^t\right)\right]\right)$$

Where Cov $\left(\acute{Y}_{h,}^t \grave{A}_h^t\right)$ denotes covariance between $\acute{Y}_h^t$ and $\grave{A}_h^t$ and is given by:

$$\mathrm{Cov}\left(\widehat{\mathrm{Y}}_{\mathrm{h}}^{\mathrm{t}}, \widehat{\mathrm{A}}_{\mathrm{h}}^{\mathrm{t}}\right) = \frac{N_h(N_h - n_h)}{n_h(n_h - I)} \sum_{i=I}^{n_h} \left(\hat{Y}_{h,i}^t - \hat{y}_i^t / N_h\right) A_{h,i}^t$$

Methodology of Crop Cutting Experiments (Orchard)

1.0 <u>Concepts and Definitions</u>

Orchard: An orchard is defined as a piece of land (managed singly or jointly) with a minimum of 12 fruit trees planted in a systematic fashion.

An orchard will be considered for selection only if, there are minimum 12 fruit trees of bearing age of a single fruit crop.

Stray tree: The trees planted in clusters of less than 12 trees and those planted on road sides, river banks, field bunds, courtyards of houses etc. are defined as stray trees.

A tree of bearing age: A tree of a given fruit attaining the age at which a majority of trees of that fruit normally bear fruit, irrespective of the fact whether or not the tree bears fruit during the particular year/season, is defined as a tree of bearing age. For example, the bearing age is normally taken to be five years for mango, four years for citrus, two years for grapes and one year for banana.

Young tree: A young tree is a tree which has not attained the specified bearing age of the fruit.

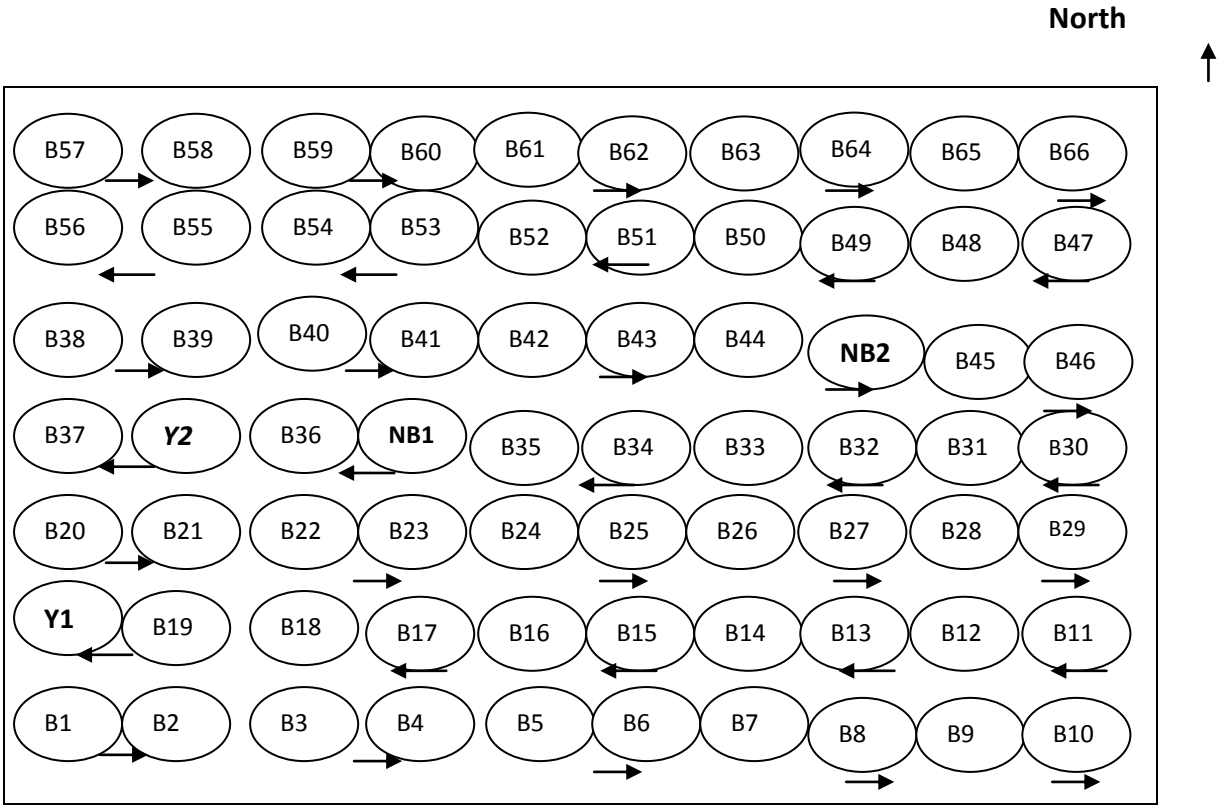
Bearing tree: A bearing tree is a tree of bearing age which has borne fruit any time in the past and also bears fruit during the season.

Non bearing tree: A non-bearing tree is a tree which has reached the bearing age but is not bearing fruit during the season due to any reason such as disease, old age, withering of flowers or any other agro-climatic factor.

2. Procedure of Crop Cutting:-

2.1 Orange, Peach, Pear, Lime, Lemon, Mango, Guava, Cashew-nut, etc.

2.1.1 Enumeration of fruit trees: First of all south west corner of the selected orchard should be located. South west corner of the orchard is the corner where if one stands facing the north, the orchard should lie on the right hand side. Fruit trees should be counted in a serpentine fashion from south-west corner moving towards the length (customary) of the orchard. Numbering of trees should be done as per status of tree i.e. bearing, non-bearing and young (Fig -1)



B=Bearing, NB= Non-Bearing, Y = Young

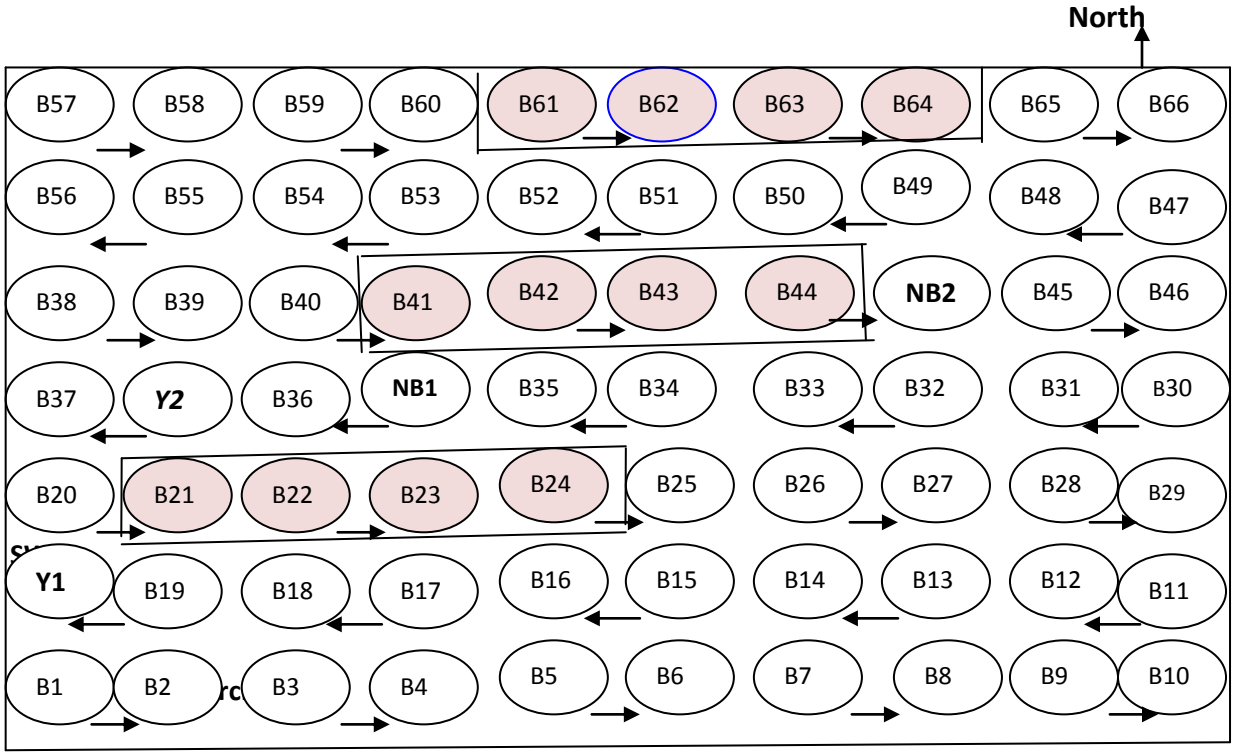
MANGO ORCHARD

Figure-1: Step -1 Enumeration and Numbering of trees

2.1.2 Selection of clusters

All fruit bearing trees should be considered for making the cluster. A cluster consists of four fruit bearing trees. Therefore, all fruit bearing trees of the selected orchard should be divided by 4 to obtain the total number of clusters. There is a chance of getting one or two or three in the last cluster. Three out of a total number of clusters should be selected randomly for recording the produce. (Figure -2)

Example: As shown in Figure-1, there are 66 fruit bearing trees which form 17 clusters (16 are complete clusters while 17th cluster has two trees). Out of 17 clusters, three clusters have to be selected using two digit random numbers table. Let column number 1 is assigned to primary worker. Therefore, column number 1 of two digit random numbers table is referred for selection of cluster. Since random numbers 11, 06 and 16 appear, therefore, clusters number 06,11, and 16 are selected (Figure – 2). The cluster number 6 contain tree number 21,22,23 and 24. Cluster number 11 has tree number 41,42,43 and 44. Tree number 61, 62, 63 and 64 are in cluster number 16. Tree number 21, 22, 23 and 24 of cluster number six, tree number 41,42,43 and 44 of cluster number 11 and tree number 61, 62, 63 and 64 of cluster number 16 are to be observed for recording the yield. Each picking or harvesting of selected fruit trees of selected clusters has to be observed as per usual practice and recorded at the appropriate place.



SW corner

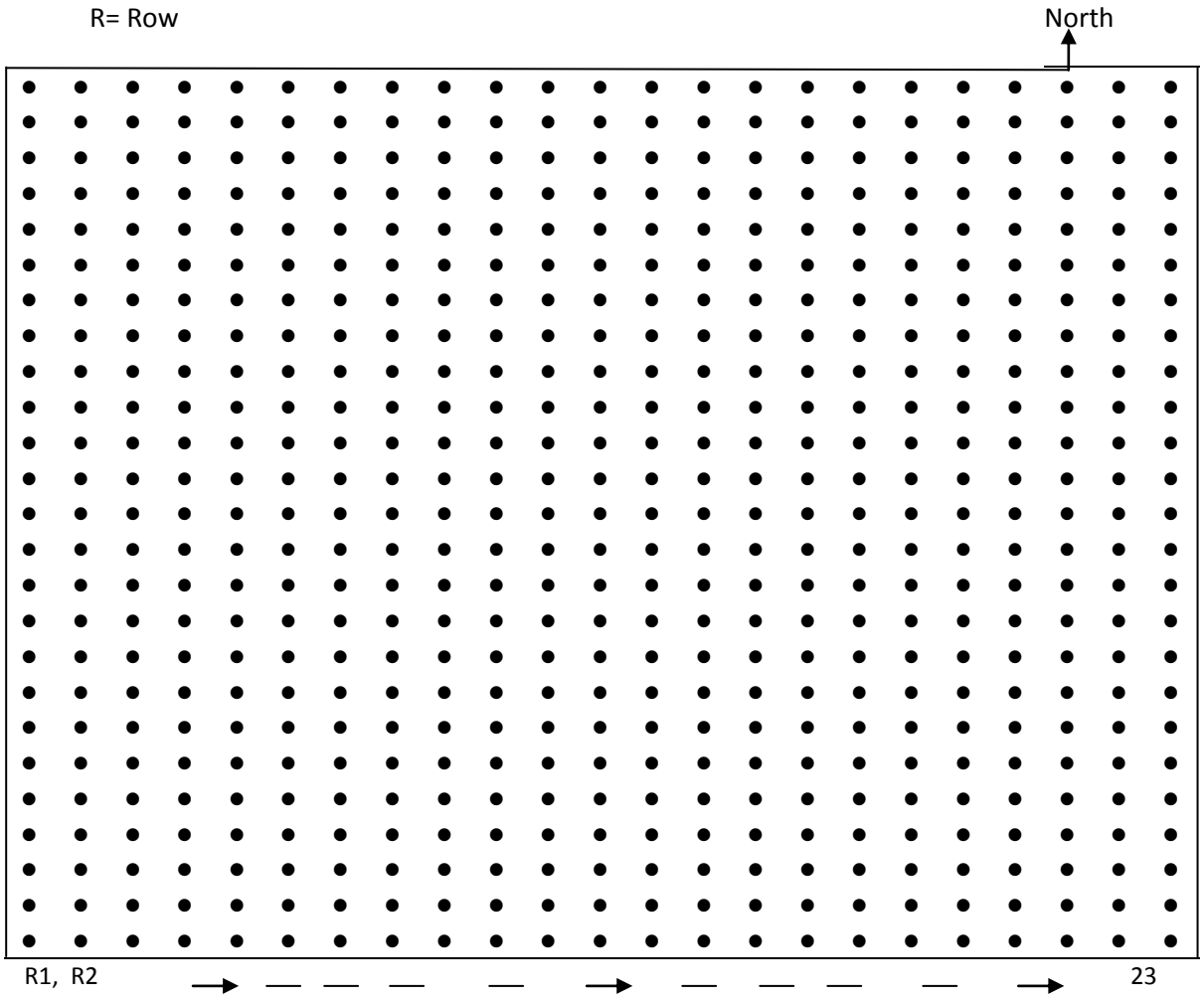
Mango Orchard

Figure – 2: Step 2 - Selection of cluster

2.2 Banana:

2.2.1 Enumeration of rows

Starting from the south-west corner of the selected orchard in the direction of length of the field, count the total number of rows in the orchard (Fig-3)



Banana orchard

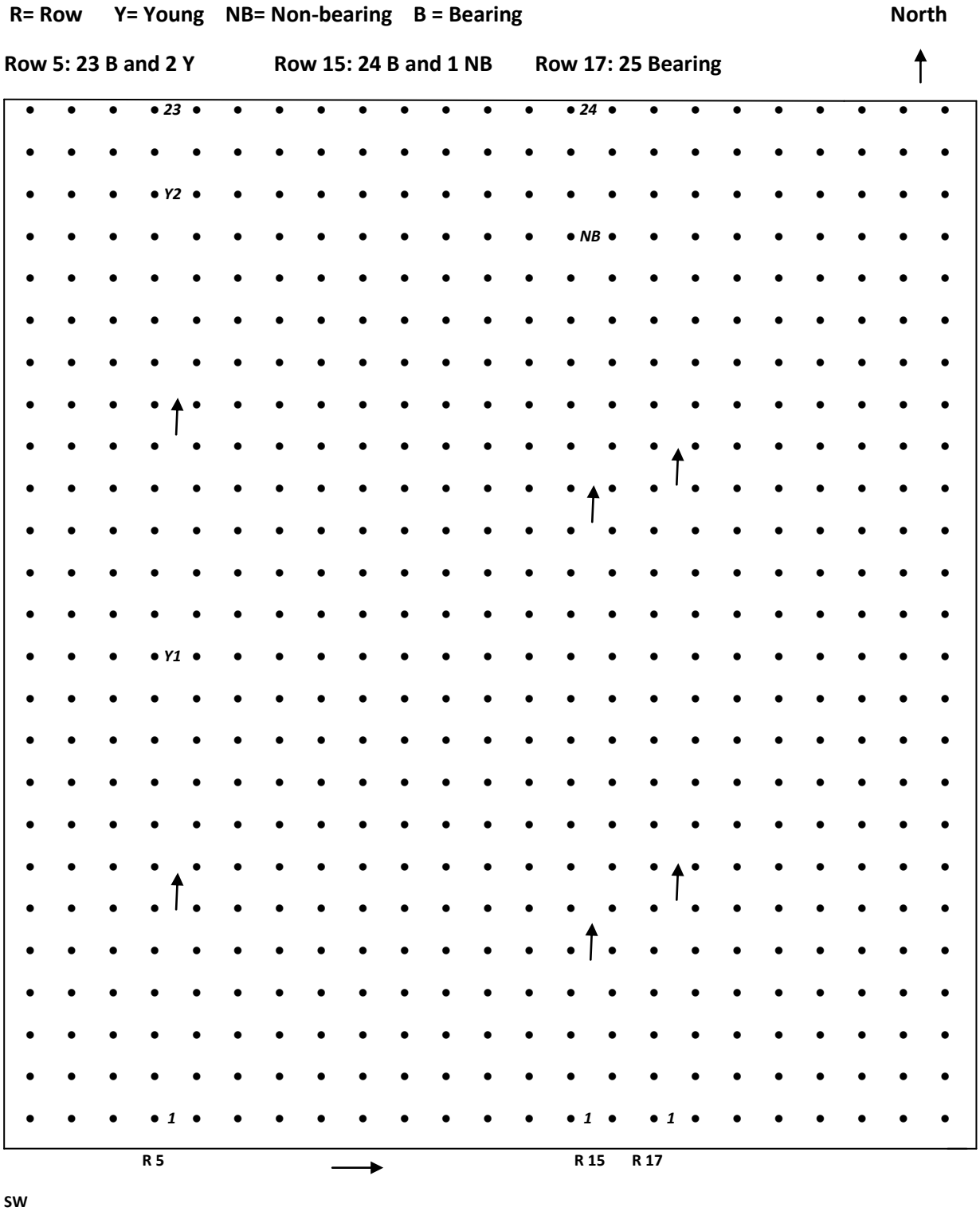
Figure – 3: Step 1- Enumeration of Rows

2.2.2 Selection of rows and enumeration of trees in selected rows:-

Out of the total number of rows, select three rows randomly. Mark the selected rows, count the total number of trees in each selected row and assign the number for each tree as per status of the tree i.e. bearing, non-bearing and young (Fig -4)

2.2.3 Selection of clusters:-

Make the cluster of trees (cluster = four fruit bearing trees) in each selected row and select one cluster randomly from each selected row. Mark the trees of each selected cluster in each selected row and observe the trees for recording the yield per tree. (Fig – 5)

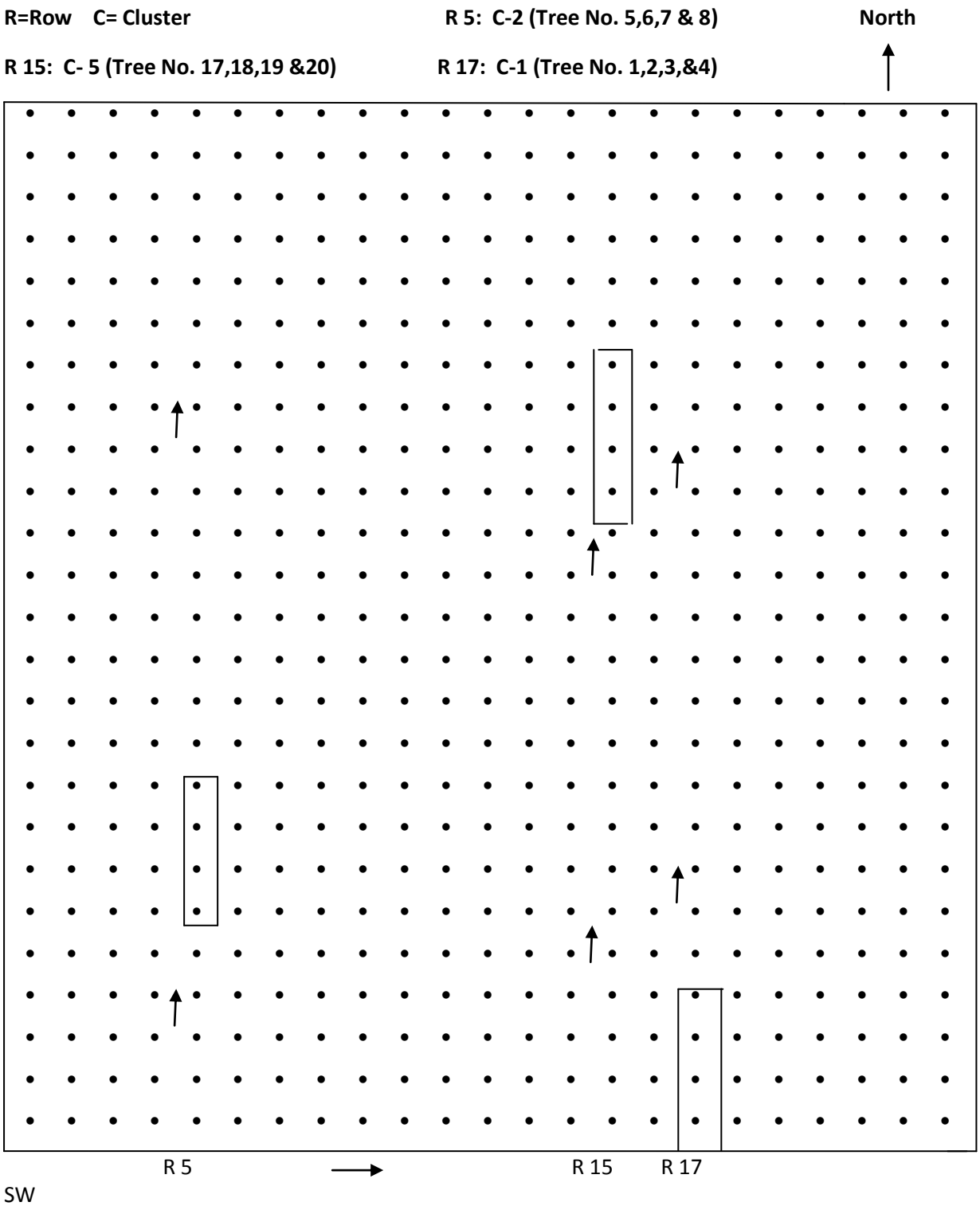


Banana Orchard

Figure -4: Step 2- Enumeration of trees in selected rows

Example: There are 23 rows in the banana orchard. Referring to the column number two (as assigned) of two digit random number table, the selected row are 5, 15 and 17. Numbering for each type of tree in each selected row should be done. In row number 5, 23 trees are fruit bearing and two are young. In row number 15, 24 trees are fruit bearing and one is non-bearing. In row number 17, all trees are fruit bearing.

There are six clusters in rows number 5 and 15 while row number 17 has 7 clusters. In rows 5 and 15, last cluster has 3 and 1 fruit bearing tree respectively. From each selected row one cluster has to be selected randomly using column number three (as assigned) of one digit random number table. Thus cluster number 2 of row number 5, cluster number 5 of row number 15 and cluster number one of row number 17 have been selected for recording the yield. The bunch of the banana has to be cut when it is fully mature. The weight of the bunch and number of fingers (banana) in bunch has to be recorded at the appropriate place.



Banana Orchard

Figure – 5: Step 3 – Selection of cluster.

Methodology of Crop Cutting Experiments for Vegetables

Plot size for crop cutting experiments of vegetable crops: 10 x 2 meter rectangular plot in hilly areas.

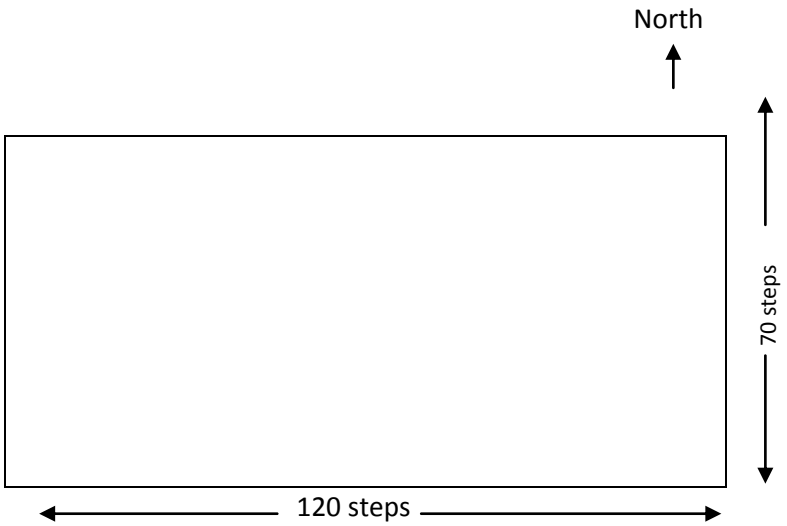
Vegetable field: If minimum area of vegetable field is 100 square meters in plain and 50 square meter in hilly region then it will be considered as a vegetable field for crop cutting experiment.

1. Procedure of Crop Cutting Experiments.

1.1 South-west corner of the selected field

After selection of the field, the south-west corner of the field has to be located. South-west corner of the field is mandatory for the purpose of supervision. In case, the selected field is not exactly in the direction of north-south and east-west, the corner which is approximately south-west may be taken as south-west corner. South west corner is that corner where if one stands facing north, the selected field should be in front and on right hand side.

1.2 Measurement of the length and breadth of the selected field



Length = 120 steps **Breadth = 70 steps**

Fig- 1: Field in regular shape.

1.2.1 Regular shape of the selected field.

Starting from the south-west corner of the field, measure the length along the longer side of the field and breadth along the shorter side of the field in steps.

(Fig – 1)

1.2.2 Irregular shape of the selected field.

In case the selected field is irregular in shape, enclose the selected field in a regular shape by outer least possible dimensions. Starting from the south west corner of the outer regular shape of the irregular field, measure the length along the longer side and breadth along the shorter side in steps. The south-west corner of the plot should be fixed with reference to the south-west corner of the outer regular shape of the irregular field (Fig. 2 and 3)

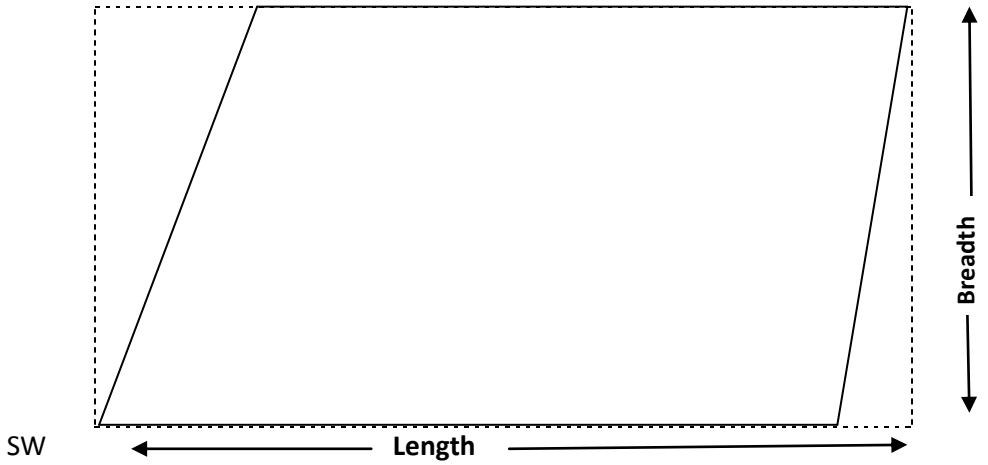


Fig – 2: Field in irregular shape

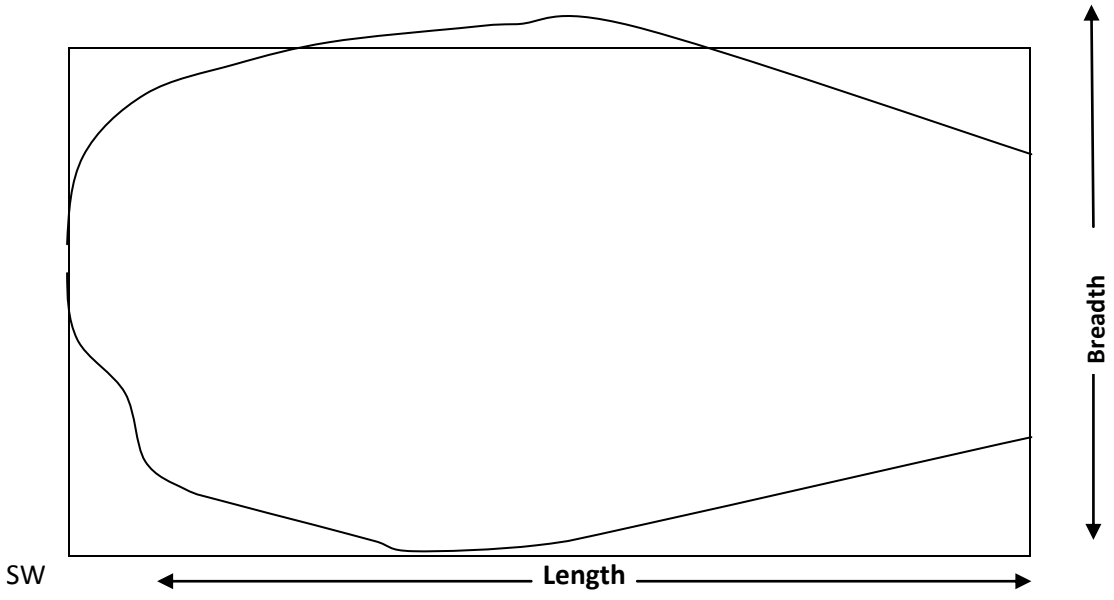


Fig -3: Field in irregular shape

1.2 Determination of the random number pair.

After measuring the length and breadth of the selected field in steps, 14 steps (14 steps are equal to 10 meters approximately) from length and 3 steps (3 steps are equal to 2 meters approximately) from breadth should be deducted to ensure that the whole experimental plot is accommodated within the selected field.

Example:

Length of the selected field	=	120 steps
Deduct	=	14 steps
Net steps	=	106 steps
Breadth of the selected field	=	70 steps
Deduct	=	3 steps
Net steps	=	67 steps

Now, two random numbers are to be selected one for the length and the other for breadth. Suppose column 1 of the random number table is allotted to the primary worker. The net steps for length are 106, therefore, three-digit random number table has to be referred. Selected random number for length should not be greater than 106. The random number that appears first in column number 1 is 58. Therefore, the number 58 is selected for length. The net steps for breadth are 67. Since 67 comprises of two digits, therefore, two-digit random number table has to be referred. The selected random number for breadth should not be greater than 67. The random number that appears first in column number 1 is 51. Therefore, the number 51 is selected for breadth. The random numbers pair selected for locating the south west corner of the plot is (58, 51). If the assigned column is exhausted during the process of selection of random numbers, the next column on the right side will have to be referred. If the whole experimental plot does not lie within the field owing to irregular shape of the field, the random number pair should be rejected and a new pair should be selected.

1.3 Marking of the experimental plot.

Since the random number pair selected is (58,51), move 58 steps along the length of the field from south-west corner of the field and then move 51 steps perpendicular to the length and parallel to the breadth of the field. The point so reached is the point “A” as shown in Fig. 4. The point “A” is called the key point of the experimental plot. Fix a peg at the key point of the experimental plot.

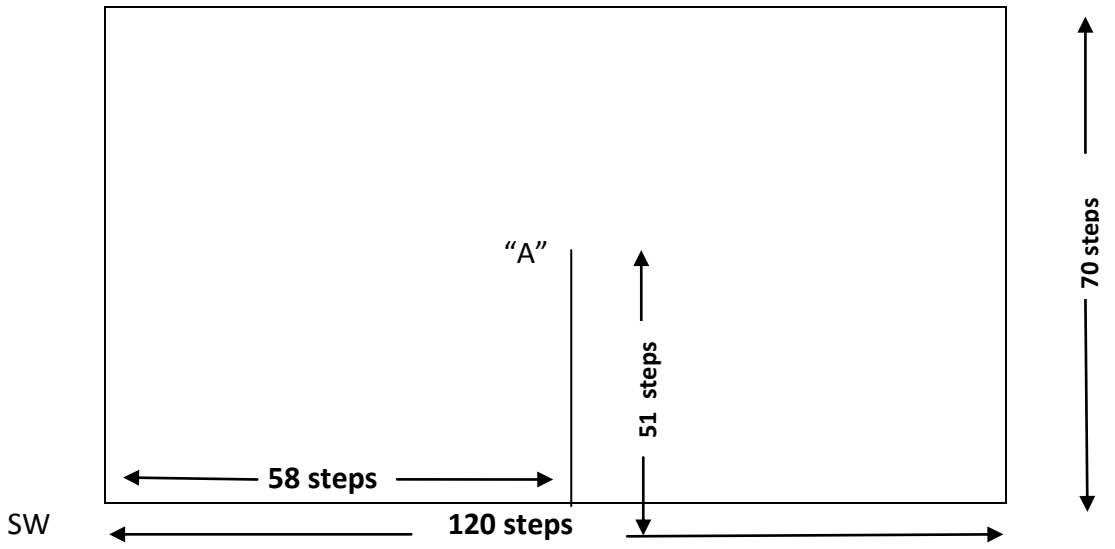


Fig – 4: Marking of plot (Step -1)

Measure ten meters along the length of the field from corner "A" and reach the next corner of the experimental plot say corner "B". Fix a peg at corner "B" (Fig. 5). The line joining the point "A" and "B" is the base of the experimental plot.

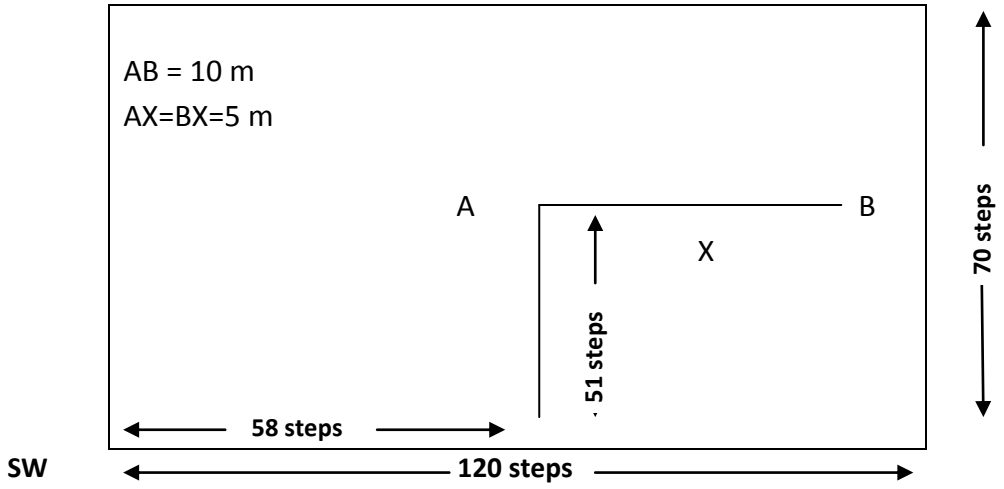


Fig – 5: Marking of plot (Step -2)

For marking the third and fourth corner of the experimental plot, use right angle triangle method. Measure 5 meter from point "A" on the AB line and fix a peg "X". It is a midpoint of line AB. Open the measuring tape up to 7.39 {2+sqrt (5^2 + 2^2)} meter. Hold at point "X" and 7.39 meter at point "B". Stretch the measuring tape holding at 5.39 meter inner side (in the direction of breadth of the field) of the field. The point reached by stretching the measuring tape is third corner say "C" of the experimental plot. The point "C" is 2 meter away from point "B" and 5.39 meter (diagonal) from midpoint "X". To find out the fourth corner, repeat the same exercise holding 7.39 meter at point "A" and 0 at mid point "X". This corner will be the fourth corner say "D" of the experimental plot. Fix pegs at corners "C" and "D". The lines AD and BC should be parallel to the breadth of the

field. The distance between C and D should be equal to 10 meter. Verify the distance of diagonal AC and BD which should be 10.20 {sqrt(10^2 + 2^2)} meter. Check the distance between A and B = 10 meter, B and C =2 meter, C and D = 10 meter D and A = 2 meter. Each angle of the rectangular experimental plot should be 90 degree. A, B, C and D are the four corner of the experimental plot. It is important that the pegs should be tall, straight and firmly fixed on the ground at each corner of the experimental plot.

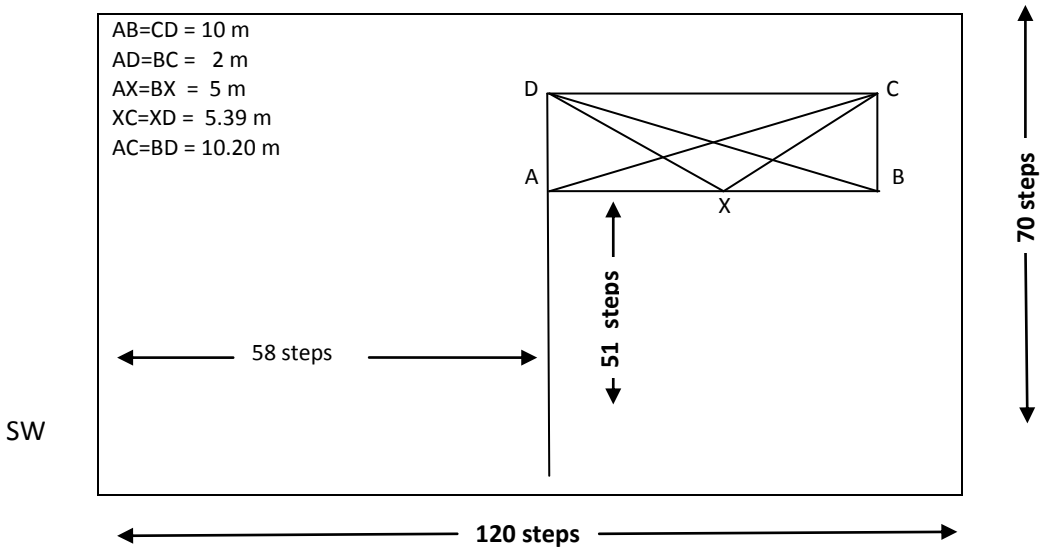


Fig -6: Marking of plot (Step -3)

Harvesting/Picking

A well stretched string should be tied around the pegs and it should be lowered gradually to the ground level. The position of the string on the ground demarcates the boundary of the experimental plot. The decision about whether or not the plants lie within the experimental plot will be made on the basis of position of their roots. The plants on the boundary of the plot will be considered for picking only if the roots are more than half inside the experimental plot. Care should be taken to pick all the matured fruits/vegetable/leaves from all plants covered under experimental plot. Vegetables wise explanation for picking is as under.

1.5.1 Erect type vegetables (Brinjal, Cauliflower, Cabbage, Leafy Vegetables, Ladyfinger etc.)

The plants within the experimental plot should be considered for picking as described above. In case the crop is not ready for harvest at one time like cauliflower, cabbage, etc., it should be harvested twice or thrice. All the pickings should be considered for recording the yield for crops like ladyfinger, brinjal, tomato, etc. Produce obtained from experimental plot should be weighed and recorded at every picking and final weight of all pickings should be obtained by adding weight of each picking when last picking is over.

1.5.1.1 Dry Chillies.

The farmer, generally, sells first one or two pickings as green chillies for getting the remuneration. Chillies from subsequent pickings are allowed to ripen as dry chillies. The purpose of conducting the crop cutting experiment is to estimate the average yield of dry chillies, therefore, all the chillies of the experimental plot should be allowed to ripe. All the pickings for dry chillies in the selected experimental plot are to be attended as per the local practice. The date of picking should be decided in advance in consultation with the farmer. The weight of chillies (as picked up) has to be taken for each picking just after the last picking is over.

1.5.2 Cucurbits/Vine type vegetables.

Produce from the vine falling within the boundary of the experimental plot should be considered for picking. Produce of each picking should be recorded and final weight of all the picking should be recorded.

A NOTE ON THE SAMPLING METHODOLOGY FOR ESIMATION OF EXTENT OF CULTIVATION AND PRODUCTION OF FRUIT CROPS.

1. In view of the special features of fruit crops, estimation of extent of cultivation and production of fruits crops is somewhat different than other crops. Some of the features are:-

i) As against seasonal nature of field crops, fruits are perennial crops.
ii) Fruit trees, besides being grown in regular orchards, are also extensively grown on canal banks, field bunds, road sides, back yard of houses and even as stray trees.
iii) Different fruits are frequently grown in the same orchard
iv) Fruit trees take quite a few years before they start bearing fruit.
v) All the trees in an orchard may not be of the same age i.e. an orchard may contain both bearing and young trees.
vi) Harvesting of fruits trees is done in a number of picking extending over several weeks.
vii) Several fruits like citrus, guava etc. have two harvesting seasons in a year.

All these points are to be carefully considered while planning a sample survey to estimate the extent of cultivation and yield of fruits.

1.2 Unlike other crops, extent of cultivation of a fruit may be measured in terms of area under the crop or by the number of trees both bearing as well as young. However, only bearing trees contribute towards the production of the fruit. The number of young trees on the other hand provides an idea of the extent of cultivation of the crops in the future.

1.3 The choice of sampling design would depend upon whether only one fruit is of interest or more than one fruits are being studied. Normally the survey may be planned to cover all important fruit crops simultaneously at the State level. However, if single fruit is to be covered for some specified area, say the district level on the basis of importance of the crops, the sampling design for such surveys may be used. Accordingly, the sampling design for single fruit in a district and for several fruit crops at the State level are separately described below:

2. Sampling plan for surveys to estimate the extent of cultivation and production of a single fruit crops in a district.

Each villages in the district may be identified as "reporting or non-reporting" for the crops on the basis whether the fruit is grown in the village or not. A list of 'reporting" as well as 'non-reporting" villages may be prepared along with area under the fruit. This information may be obtained from revenue records or from past year data.

2.1. Sampling design:

The sampling design may be broadly defined as stratified three stage random sampling. The tehsils/taluks/blocks or groups thereof in the district may be taken as strata, villages as primary sampling units, orchards as second stage units and clusters of trees as the ultimate units of sampling. The sample size of villages i.e. the number of villages to be selected in the district may be allocated to different strata in proportion to the area under the fruit in the strata. The 'reporting' villages in a stratum may be regarded as p.s.u's and selection of allocated or the desired number of villages may be done by pps with replacement, taking area under the fruit as the size measure. Orchard in the selected villages and cluster of trees in the orchards are then selected with SRSWOR. Also since there may be errors in the reporting/recording of fruit cultivation or some fruit cultivation may be taken up in the "non-reporting" villages, a sample of villages may also be selected from the "non-reporting" groups of villages in each stratum. For determining the extent of cultivation, the selected villages may be completely enumerated to obtain information on the area under fruit orchards and the number of trees both in the orchard as well as stray tree. The trees may also be enumerated with respect to the varieties as well as status about bearing or non-bearing fruits. Apart from estimation of extent of cultivation of fruit, complete enumeration would also provide a frame of orchards for further selection of orchards and trees for estimating of yield.

For estimation of yield of fruit, five orchards may be selected by SRSWOR to record information regarding cultivation practices such as irrigation, manuring, intercropping and other practices followed by the orchardists throughout the year. From each of the selected orchards, three clusters of four trees each of bearing age may be selected at random for recording data on yield of a fruit throughout the harvesting season.

2.2 Sample size

A total of 150 – 200 reporting villages (p.s.u's) may be selected in the district. As described above, this number may be allocated to different strata (tehsils) in proportion to area under orchards and the allocated number of villages in a stratum may be selected with pps with replacement. At the second stage of sampling 5 orchards may be selected at random and from each selected orchards, three clusters of 4 bearing trees may be selected at the ultimate stage of sampling. Earlier surveys have shown that with this type of design and sample size, the average yield at the district level is likely to be estimated with a standard error of about 5% and the area and total production with a S.E. between 5 to 10%. However, the efficiencies of various estimators would depend upon the amount of variability in different characters. Surveys conducted during initial years will provide an idea about these variabilities and accordingly the number of villages and orchards selected may be modified to achieve the desired degree of precision.

3. Sampling plan for estimation of extent of cultivation and production of more than one fruit crops in a state:

The important fruit crops whose production is to be estimated should be first identified. Normally, the previous years' area figures under different fruit crops are available at the tehsil/taluk level and these may be used to determine the important fruits in the state. Since the cultivation of fruits is usually not so evenly spread and may in fact be concentrated in a few districts/regions, the first step in the planning of fruit survey is to identify and delimit the important fruit growing regions or areas for different fruits. A district is considered too large a unit of area for this purpose. However, taluks or sub-divisions equivalent areas in a district may be considered appropriate. Thus taluks which are important at least for one of the fruit crops may be identified as important fruit growing taluks. It may be mentioned that importance of a taluk with respect to a fruit is determined on the basis of area under that fruit and thus a taluk's important for a given fruit may not be important for other fruits. As a broad guideline, for a given fruit, the important taluks are those which taken together cover 40-50% of the total area under that fruit in the entire State.

3.1. Sampling design and sample size.

All taluks/sub-divisions, considered important fruit growing areas as described above, may be taken as strata. The remaining area or taluks may be further classified or grouped in to 4 to 5 strata with respect to importance of individual fruit crops taking in to account the geographical contiguity. In these strata, taluks may be considered as primary sampling units. Thus survey would then cover all important fruit growing taluks i.e. taluks in which fruit cultivation is concentrated as well as the selected taluks out of the rest.

In the selected taluks also, all the villages may not be growing all the fruits. A frame of villages growing different fruit in a stratum is, therefore, prepared. Accordingly, villages in a stratum may be classified in to two categories (i) growing at least one fruit and (ii) growing no fruit at all. In category (i) on the basis of village-wise area under fruits, villages may be identified as 'reporting' or "non-reporting" for individual fruits. If the reported areas are considered as reliable, efforts may be concentrated only in the reporting villages for each fruit. However, experience shows that faculty reporting is not uncommon and therefore, adequate representation may be given to non-reporting group. From the reporting group of villages for a given fruit crop four villages may be selected with replacement and with probability proportional to area reported under the fruit crops. From the non-reporting group of villages (in which other fruits are grown), a sample of two villages may be selected in each stratum with SRSWOR. From the villages in category (ii) where no cultivation of fruits is reported, a sample of two villages may be selected with SRSWOR. The selected villages may be completely enumerated for the extent of cultivation and number of trees in orchards as also the stray trees.

For yield estimation, a sub sample of two villages out of four reporting villages may be retained in all the major fruit growing taluks/strata and from each village 5 orchards and 3 clusters of 4 trees each of bearing age may be selected for this purpose. The selected clusters of trees may be observed for entire harvest period both with respect to weight as well as number of fruit. However, exceptions to this procedure may be made for certain crops like banana and grapes. A uniform approach in this regard is essential for comparability as well as pooling of estimates over different areas.

ESTIMATION PROCEDURE FOR

1. Sampling plan for surveys to estimate the extent of cultivation and production of a single fruit crop in a district.

(A) Estimation of extent of cultivation

Define the following notations

l = Total number of strata.

$N_{h(R)}$ = Total number of reporting villages in the h^{th} stratum.

$n_{h(R)}$ = Total number of reporting villages selected in the h^{th} stratum.

P_{hi} = Probability of selecting i^{th} village in the h^{th} stratum.

$N_{h(NR)}$ = Total number of non reporting villages in the h^{th} stratum.

$n_{h(NR)}$ = Total number of non reporting villages selected from the h^{th} stratum.

P = Number of orchards selected (p = 5 in the present case) in a village for conducting yield study

$X_{hi(R)}$ = Value of the character under study e.g. number of trees bearing or young or total number of orchard, area under orchards etc. recorded on the basis of complete enumeration of trees in the i^{th} village selected with probability P_i in the h^{th} stratum from the reporting group of villages.

$X_{hi(NR)}$ = Value of the character under study e.g. number of trees bearing or young or total number of orchards, area under orchards etc. recorded on the basis of complete enumeration of trees in the i^{th} village selected with equal probability in the h^{th} stratum for the non reporting group of villages.

An estimate of total for the character x in the reporting group for the h^{th} stratum is obtained as

$$\hat{X}_{h(R)} = \frac{I}{n_{n(R)}} \sum_{i}^{n_{h\,(NR)}} \frac{X_{hi(R)}}{P_{hi}}$$

An estimate of total for the character x in the no-reporting group for the h^{th} stratum is obtained as

$$\hat{X}_{h(NR)} = \frac{N_{h(NR)}}{n_{h(NR)}} \sum_{i}^{n_{h(NR)}} x_{h(NR)}$$

The total of the h^{th} stratum as estimated on the basis of samples selected (reporting as well as non-reporting) is given by

$$\hat{X}_h = \hat{X}_{h(R)} + \hat{X}_{h(NR)}$$

The pooling of strata estimates to get district level estimate

$$\hat{X} = \sum_{h=I}^{I} \hat{X}_{\mathrm{h}}$$

Estimation of variance

An estimate of variance for the non reporting group in the hth stratum is given by:

$$\hat{V}\left(\hat{X}_{h(R)}\right) = \frac{I}{n_{h(R)}\,(n_{h(R)}-1)} \left\{ \sum_{P_{hi}^2}^{n_{h(R)}\; X_{hi(R)}^2} - \; n_{h(R)}\; \hat{X}_{h(R)}^2 \right\}$$

An estimate of variance for the non reporting group in the hth stratum is given by:

$$\hat{V}\left(\hat{X}_{h(NR)}\right) = \frac{N_{h(NR)}\left(N_{h(NR)} - \; n_{h(NR)}\right)}{n_{h(NR)}\left(n_{h(NR)} - \; I\right)} \sum_{i}^{n_{h(NR)}} \left(X_{hi(NR)} - \frac{I}{n_{h(NR)}} \sum_{i}^{n_{h(NR)}} X_{hi(NR)}\right.$$

The variance of $\widehat{X}$ in the hth stratum is obtained as

$$\hat{V}\left(\hat{X}_h\right) = \hat{V}\left(\hat{X}_{h(R)}\right) + \; \hat{V}\left(\hat{X}_{h(NR)}\right)$$

Estimate of variance for the district is the sum of estimates of variances of all the strata

$$\hat{V}\left(\hat{X}\right) = \sum_{h=I}^{I} \hat{V}\left(\hat{X}_h\right)$$

Percentage of standard error of $\hat{X}$ is given by

$$\%\ \text{S.E.}\ \left(\hat{X}\right) = \frac{\sqrt{\hat{V}(\hat{X})}}{\hat{X}}\ X\ 100$$

(B) Estimate of overall average yield per tree

As mentioned in the sampling plan, the villages were selected with probability proportional to area under the fruit. It is reasonable to assume that the area under a particular fruit is proportional to the number of bearing trees of the fruit.

Define the following notations:

Y_{ij} = Average yield per tree in the j^{th} orchard of the i^{th} village

Y_{hi} = Average yield per tree in the i^{th} village of the h^{th} stratum

B_h = Total number of bearing trees of the h^{th} stratum

B = Total number of bearing trees of the district

$\hat{Y}_{hij}$ = Average yield per bearing tree obtained from 12 bearing trees harvested in the j^{th} orchard of the i^{th} village in the h^{th} stratum

B_{hi} = Number of bearing trees of the i^{th} village in the h^{th} stratum

The estimate of number of bearing trees of the h^{th} stratum is given by

$$\hat{B}_h = \frac{I}{n_h}\sum_{i}^{n_h}\frac{B_{hi}}{P_{hi}}$$

The estimate of number of bearing trees of the district is given by

$$\hat{B} = \sum_{h=I}^{i}\hat{B}_h$$

The estimate of average yield per tree in the i^{th} village of the h^{th} stratum is given by

$$Y_{hi} = \frac{I}{P_j}\sum_{I}^{p}Y_{ij}$$

The estimate of average yield/tree of the h^{th} stratum is given by

$$\hat{Y}_h = \left(\sum_{i}^{n_R}\frac{B_{hi}\hat{Y}_{hi}}{P_{hi}}\right) / \left(\sum_{i}^{n_R}\frac{B_{hi}}{P_{hi}}\right)$$

The estimate of average yield/tree of the district is given by

$$Y_{(\text{pooledover all strata})} = \sum_{h=I}^{I} \left(\sum_{h=I}^{L} \hat{B}_h \right) y_h$$

Estimation of variance for average yield

The estimation of variance for average yield is given by

$$\hat{V}(Y_h) = \frac{I}{n_h\ (n_h\ -\ I)(\hat{B}_h)^2} \sum \frac{\hat{B}_{hi}^2}{P_{hi}^2} (\hat{Y}_{hi} - \hat{Y}_{hi})$$

The estimate of variance for district is given by

$$\hat{V}\left(Y_{(\text{pooledover all strata})} \right) = \sum_{h=I}^{L} \left(\frac{\hat{B}_h}{\sum_{h=I}^{L} \hat{B}_h} \right)^2 \hat{V}(\hat{Y}_h)$$

(C) Estimation of total production

$$\hat{Y} = Y_{(Pooled\ \ over\ \ all\ \ strata\ )} \times \hat{B}$$

The estimates of variance is given by

$$\hat{V}(Y) = (\hat{Y})^2_{\text{pooled}}\ \hat{V}(\hat{B})_{\text{pooled}} + (\hat{B})^2_{\text{pooled}}\ \hat{V}(\hat{Y})_{\text{pooled}} - \hat{V}(\hat{B})_{\text{pooled}} \times \hat{V}(\hat{Y})_{\text{pooled}}$$

ESTIMATION PROCEDURE FOR

Estimation procedure for working out estimates of number of trees, area, average yield and total production of each fruit for

2. Sampling plan for estimation of extent of cultivation and production of more than one fruit crops in a state.

Consistent with the sampling plan, the estimates of the number of trees/area under a given fruit crop in a given stratum can be obtained as follows:

Define the following notations:

Let,

N = Number of primary sampling units (psu's) – villages in the case of those taluks which were taken strata as such and taluks in the case of remaining strata.

n = Number of psu's selected in the given stratum

P_i = Probability of selecting i^{th} taluk in a given stratum in which the taluks were taken as psu's.

$M_{if\ (R)}$ = Number of villages reported to be growing f^{th} fruit crop (either banana, mango, citrus or grapes or any other fruit) in the i^{th} taluk.

$m'_{if\ (R)}$ = Number of villages selected from reporting group for the f^{th} fruit crop in the i^{th} taluk i.e. number of villages selected from $M_{if(R).}$

$m_{if\ (R)}$ = Number of villages selected for yield study for the f^{th} fruit from i^{th} taluk.

$M_{if\ (NR)}$ = Number of villages not growing f^{th} fruit in a given stratum.

$m_{if\ (NR)}$ = Number of villages selected from out of $M_{if\ (NR)}$ in a given stratum.

P = Number of orchards selected in a village for conducting yield study (p - 5 in the present case) of a particular fruit.

Y_{ijl} = Average yield per bearing tree obtained from 12 bearing trees harvested in l^{th} orchard of j^{th} in the i^{th} taluk.

$X_{ijf\ (R)}$ = Value of the character under study e.g. number of trees, bearing or young or total number of orchard etc. recorded on the basis of complete enumeration of j^{th} village selected with probability P_{ijf} in the i^{th} taluk from the reporting group.

$M_{i\ (NA)}$ = Number of villages not growing any fruit in the i^{th} taluk.

$m_{i\ (NA)}$ = Number of villages selected from out of $M_{i\ (NA)}$ in the i^{th} taluk

$X_{ij\ (NA)}$ = Value of the character under study based on complete enumeration in j^{th} village selected from the non reporting group for all the fruits from the i^{th} taluk.

An estimate of total for the character x (briefly we call it total unless otherwise stated) in the reporting group for the f[th] fruit in the i[th] taluk is given by

$$\hat{X}_{if\ (R)} = \left(I/m'_{if(R)}\right) \sum_{j=I}^{m'_{if(R)}} X_{ijf\ (R)}\ /P_{ijf}$$

An estimate of total in the non-reporting group for f[th] fruit in the i[th] taluk is

$$\hat{X}_{if\,(NR)} = \left(M_{if\,(NR)}/m_{if\,(NR)}\right) \sum_{j=I}^{m_{if\,(NR)}} X_{ijf\ (NR)}$$

The total of the i[th] taluk for f[th] fruit $\hat{X}_{if} = \hat{X}_{if\,(R)} + \hat{X}_{if\,(NR)}$

An estimate of total in the group which is non-reporting for all the fruits is given by

$$\hat{X}_{i(NA)} = \left(M_{i(NA)}/m_{i(NA)}\right) \sum_{j=I}^{m_{i(NA)}} X_{ij\,(NA)}$$

An estimate of total on the basis of samples selected for all the fruits Q(f=1,2,3,4) in the i[th] taluk is given by

$$\hat{X}_i = \frac{I}{4}\sum_{f=I}^{4} \hat{X}_{if} + \hat{X}_{if\,(NA)}$$

The estimate of total in the strata where taluks are taken as psu's is given by

$$\hat{X} = \left(N/n\sum_{i=I}^{n} \hat{X}_i\right) \quad if\ taluks\ are\ selected\ with\ equal\ probabilities\ without\ replacement$$

$$= \frac{1}{n}\sum_{i=I}^{n} \hat{X}_i/P_i \quad if\ taluks\ are\ selected\ by\ probalities\ P_i's\ with\ replacement$$

The total in the entire State is estimated by adding $\hat{X}$ over all the strata.

Estimation of variance

An estimate of variance of $\hat{X}$ in those strata where taluks are taken as psu's is given by

$$\hat{V}(\hat{X}) = \left(N(N-n)/n(n-1)\right)\left[\sum_{i}^{n}\hat{X}_i^2 - \frac{1}{n}\left(\sum^{n}\hat{X}_i\right)^2\right]$$

When psu's are selected with equal probabilities. In this case the variance components due to psu's have been ignored due to their insignificant contribution towards the total variance.

$$\left(\sum_{i=I}^{n}\hat{X}_i^2 - n\hat{X}^2\right)/n(n-I)$$

when psu's are selected with pps with replacement. An estimate of variance of $\hat{X}$ in the taluks where taluiks are taken as strata is given by

$$\hat{V}(\hat{X}) = \frac{I}{16}\sum_{f=I}^{4}\hat{V}(\hat{X}_{if}) + \hat{V}(\hat{X}_{i(NA)})$$

Where $\hat{V}(X_{if}) = \hat{V}(X_{if\,(R)}) + \hat{V}(\hat{X}_{if\,(NR)})$

$$\hat{V}(\hat{X}_{if\,(R)}) = \frac{I}{m'_{if\,(R)}(m'_{if\,(R)} - I)}\left[\sum_{i=I}^{m'_{if\,(R)}}\frac{x_{ijf\,(R)}^2}{P_{ij}} - m'_{if\,(R)}\hat{X}_{if\,(R)}\right]$$

$$\hat{V}(X_{if\,(R)}) = \frac{M_{if\,(NR)}(M_{if\,(NR)} - m_{if\,(NR)})}{m_{if\,(NR)}(m_{if\,(NR)} - I)}\sum_{j}\left(x_{ijf\,(NR)} - \frac{I}{m_{if\,(NR)}}\sum x_{ijf\,(NR)}\right)^2$$

$$\hat{V}(\hat{X}_{i\,(NA)}) = \frac{M_{i(NA)}(M_{i(NA)} - m_{i(NA)})}{m_{i(NA)}(m_{i(NA} - I)}\sum_{j=I}^{m_{i(NA)}}\left(x_{ij\,(NA)} - \frac{I}{m_{i(NA)}}\sum x_{ij\,(NA)}\right)^2$$

The variance of the estimate of total in the entire State is estimated as the sum of the estimated variances of $\hat{X}$'s in all the strata.

Estimation of overall average yield per tree of a given fruit crop

As mentioned in the sampling plan, the villages were selected with probability proportional to area under the respective fruits. It is reasonable to assume that the area under a particular fruit is proportional to the number of bearing trees of that fruit. Under this assumption the estimate of average yield of the fth fruit in the ith taluk is given by

$$Y_{if} = \frac{I}{m_{if(R)}} \sum_{j=I}^{m_{if(R)}} Y_{ijf}$$

where

$$\hat{Y}_{ijf} = \frac{1}{P} \sum_{l=1}^{p} Y_{ijl}$$

An estimate of average yield of fth fruit in a given stratum is given by

$$Y_f = \left(\sum_{i=I}^{n} B_{if} \, \hat{Y}_{if} \mid P_i \right) / \left(\sum \hat{B}_{if} \mid P_i \right)$$

where $\hat{B}_{if}$ is the estimate of number of bearing trees of fth fruit in ith taluk. An estimate of overall average yield per tree of fth fruit is given by

$$(\mathrm{Y})_{\mathrm{pooled}} = \sum_{h} \left(\hat{B}_{fh} / \hat{B}_f \right) \hat{Y}_{fh}$$

where $\hat{B}_{fh}$ and $\hat{B}_f$ are estimates of number of bearing trees of fth fruit in hth stratum and an estimate of total number of bearing trees and pooled ober those strata which have been observed for yield study respectively and $\hat{Y}_{fh}$ is an estimate of average yield of fth fruit in the hth stratum.

An estimate of variance of $\left(\hat{Y}_f\right)_{\text{pooled}}$ is given by

$$\hat{\mathrm{V}}\left(\hat{Y}_f\right)_{(pooled\,)} = \sum_{h} \left(\hat{B}_{fh} / \hat{B}_f \right)^2 \hat{V}\left(\hat{Y}_{fh}\right) \quad where$$

$$\hat{V}\left(\hat{Y}_{fh}\right) = \frac{1}{n(n-1)\left(\hat{B}_{fh}\right)^2} \sum_{i=1}^{n} \frac{\hat{B}_{ifh}^2}{P_i^2} \left(\hat{Y}_{ifh} - \hat{Y}_{fh} \right)^2$$

The suffix h stand for h^{th} stratum.

An estimate of total production of f^{th} fruit is given by

$$\hat{Y}_f = \left(\hat{Y}_f\right)_{\text{pooled}} \text{X} \left(\hat{B}_f\right)_{\text{pooled}}$$

where $\left(\hat{Y}_f\right)_{\text{pooled}}$ is the estimate of overall yield for f^{th} fruit and $\left(\hat{B}_f\right)_{\text{pooled}}$ is an estimate of total number of bearing trees of f^{th} fruit in the entire State. With the assumption the average yield and total production of bearing trees are independent; an estimate of variance is given by

$$\hat{V}\left(Y_f\right) = \left(\hat{Y}_f\right)^2_{\text{pooled}} \text{x } \hat{V}\left(\hat{B}_f\right)_{\text{pooled}} + \left(\hat{B}_f\right)^2_{\text{pooled}} \text{ x } \hat{V}\left(\hat{Y}_f\right)_{\text{pooled}} - \hat{V}\left(\hat{B}_f\right)_{\text{pooled}} \text{ x } \hat{V}\left(\hat{Y}_f\right)_{\text{pooled}}$$

APPENDIX

Concepts and definitions to be sued in the survey

1. **Reporting or non-reporting villages**

A "reporting" village for a given fruit is one in which some area under the fruit is reported according to the latest information available with the revenue agency. The villages not reporting any area under the fruit are classified as "non-reporting" villages for that fruit.

2. **A tree of bearing age**

A tree of a given fruit attaining the age at which a majority of trees of that fruit normally bear fruit irrespective of the fact whether or not the tree bears fruit during the particular year/season, is defined as a tree of bearing age. For example, the bearing age is normally taken to be five years for mango, four years for citrus, two years for grapes and one year for banana.

3. **Bearing tree**

A bearing tree is defined as a tree of bearing age which has borne fruit any time in the past and also bear fruits during the season.

4. **Young tree**

A young tree is defined as a tree which has not attained the specified bearing age of the fruit.

5. **Non-bearing tree**

A non-bearing tree is defined as a tree which has reached the bearing age but is not found bearing fruit during the season due to any reason such as disease, old age, withering of flowers or any other agro-climatic factor.

6. Orchard

An orchard is defined as a piece of land (managed singly or jointly) with a minimum of 12 fruit trees on it planted in a systematic fashion.

7. Young and bearing orchard

An orchard in which at least 10 percent of the trees are of bearing age subject to a minimum of 6 bearing trees may be regarded as a bearing orchard; otherwise it may be taken as a young orchard

8. Stray trees

The trees planted in clusters of less than 12 trees and those planted on road sides, river banks, field bunds, courtyards of houses, etc. are defined as stray trees

District-wise demographic profile of Meghalaya

Sl. No	Name	Geographical Area (sq. km)	No. of villages	No of Household	Population	Total Workers Population	Cultivators (Main + Marginal)	Agri. Laborers (Main + Marginal)	Non-Workers Population
1	*2*	*3*	*4*	*5*	*6*	*7*	*13*	*15*	*17*
1	West Jaintia Hills	**1779**	**306**	**45272**	**272185**	**108884**	**36597**	**25955**	**163301**
2	East Jaintia Hills	**2040**	**192**	**20756**	**122939**	**45296**	**14247**	**9811**	**77643**
3	East Khasi Hills	**2748**	**923**	**164046**	**825922**	**326786**	**76767**	**40889**	**499136**
4	Ribhoi	**2448**	**579**	**46872**	**258840**	**106473**	**55833**	**19989**	**152367**
5	South Garo Hills	**1887**	**731**	**24527**	**142334**	**53069**	**28145**	**5565**	**89265**
6	East Garo Hills	**1443**	**492**	**26585**	**145798**	**58328**	**37609**	**7519**	**87470**
7	North Garo Hills	**1160**	**566**	**31743**	**172119**	**67745**	**39781**	**11727**	**104374**
8	South West Garo Hills	**866**	**495**	**33863**	**172495**	**69070**	**31028**	**17045**	**103425**
9	West Garo Hills	**2811**	**1082**	**89489**	**470796**	**186623**	**89712**	**22680**	**284173**
10	S.W.Khasi Hills	**1401**	**314**	**17047**	**99171**	**39652**	**17951**	**9685**	**59519**
11	West Khasi Hills	**3846**	**779**	**47859**	**284290**	**123693**	**67005**	**27499**	**160597**
	Total	**22429**	**6459**	**548059**	**2966889**	**1185619**	**494675**	**198364**	**1781270**

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