Field Exercise

“Biometry”

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Objectives

1. Prepare **N-D curve** for each compartment
2. Compare the **Volume** by 4 different methods
3. Finding out **Number of sampling plots** required for simple random sampling with given error and confidence limit

- Groups :

  Total no – 12

- 8 compartments – total area : 1106 ha

Steps for the field….

1. Lay sample plot
    1. Each group – 3, **Total sample plot - 36**
    2. Size : 0.1 ha
2. Measure dia of all the trees
3. Measure height of few biggest trees in each dia class
4. Prepare dia frequency table

S. n.	Dia class (in cm)	No. of trees	Average height
1	**2**	**3**	**4**
1	10-20		
2	20-30		
3	30-40		
4	…..		

5. Prepare N-D curve for each compartment (no.- 6)

(Obj -1)

   – Pool data of each group

6. Calculate **Crop Diameter**

   – Get Mean Basal Area (MBA)

Steps:

1. Tabulate field data in dia-classes

Dia class	# of trees	Basal area of mid pt.	Total basal area in dia class
10-20	n1	g1	n1 . g1
20-30	n2	g2	n2. g2
30-40	n3	g3	n3. g3
40-50	n4	g4	n4. g4
50-60	n5	g5	n5. g5
ith	ni	gi	ni. gi
Total	**∑ ni**		**∑ ni.gi**

M.B.A. = ∑ ni gi / ∑ni,

$$\text{M.B.A.} = \frac{n1gi+n2g2+\ldots\ldots\ldots\ldots nigi}{n1+n2+n3+\ldots\ldots\ldots\ldots ni}$$

$$M.B.A. = \pi * \left(\frac{\text{crop diameter}}{2} \right)^2$$

$$= \frac{\pi}{4} \times (\text{crop dia})^2$$

$$\text{Crop dia} = \sqrt{\frac{(4 \times M.B.A.)}{\pi}}$$

$$\text{Crop dia} = 2 \times \sqrt{\frac{M.B.A}{\pi}} \qquad (1)$$

.

6. Plot height diameter curve
   - Get **Site Quality**
7. Get **Crop Height**
   - Read height against crop diameter
8. We now have :
   i. **Site quality**
   ii. **Crop diameter**
   iii. **Crop height**

9. Volume calculation :

- Calculate volume for each sample plot
- 4 methods
  i. By volume table
  ii. By regression equation
  iii. By yield table
  iv. By wedge prism

i. **By Volume table :** (page 86, yield table)

S. n.	Dia class (in cm)	Mid dia (in cm)	No. of trees	Volume per tree in dia class	Total volume of dia class
1	**2**	**3**	**4**	**5**	**6 (= col 4 X col 5)**
1	10-20	15	n_1	v_1	$V_1 = n_1 . v_1$
2	20-30	25	n_2	v_2	$V_2 = n_2 . v_2$
3	30-40	35	n_3	v_3	$V_3 = n_3 . v_3$
4	.....	...			

Total volume = sum of all dia class volumes

$$V = V_1 + V_2 + V_3 + ...$$

ii. By regression equation:

$$\mathbf{V} = 0.03085 - 0.77794 \cdot \mathbf{D} + 8.42051 \cdot \mathbf{D^2} + 5.91067 \cdot \mathbf{D^3}$$

Where,

D = mean dia in dia class, in m.

V = volume per tree, in m^3

Total volume of each dia class = (volume per tree) x (no of trees)

Total volume = sum of all dia class volumes

iii. By Yield table :

- Read total BA from yield table for **calculated crop diameter** for site quality of compartment
- Density of crop = $\frac{\text{Calculated BA}}{\text{yield table BA}}$
- Read total main crop volume (stem + small wood) for crop dia from yield table (column 10)

Actual volume = (volume from yield table) x (density)

iv. By Wedge Prism:

- Take reading at any five points each with both WP
- Calculate BA per ha
  - Full tallies then counted as - 1
  - Half tallies counted as - 0.5
  - Total tallies multiplied with BAF to get BA per Ha
- Get volume per ha
  - (BA per ha) X (crop height)

10. Take the least of 3 (Sr no.- 1, 2 & 3)volumes calculated

- Compare it with volume by Wedge prism **(Obj -2)**

11. We get volume for each sample plot (v_i ; i=1,2,……,40)

- get μ = mean volume

12. find out standard deviation ‘σ ‘

$$\sigma = \sqrt{\Sigma (v_i - \mu)^2 /(n - 1)}$$

Where, n = 40

10. Find out number of plots required for 2% error and 95% confidence limit

$$n = \left[\frac{\sigma \cdot Z}{E} \right]^2 = \left[\frac{C.V. \times Z}{E\,\%} \right]^2$$

(Obj -3)

where, $C.V. = (\sigma / \mu) \times 100$

$Z = 1.96$

11. Generate random distribution of these many sample plots in GIS lab

END