

## USE OF DOMINANCE DIVERSITY(DD) CURVE TO APPROACH THE DISTRIBUTION OF RELATIVE DOMINANCE OF THE SPECIES IN THE INFESTED AND HEALTHY SITES BY GHOLWA (*HOPLOCERAMBYX SPINICORNIS*) IN DOON VALLEY

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### ABSTRACT

DD curves are drawn to interpret the community organization in Sal forest of different plant species, shrubs, herbs and climbers in terms of resource share. Geometric distribution followed by top two species (*S. robusta* and *M. philippinensis*) clearly indicates that these species are dominating the site and utilizing more than  $\frac{2}{3}$  of the total available resources. Both shrub and herb layer were showing lognormal distribution and thus showing high diversity, disturbance and competition for sharing the available resources. Importance Value index of plant species was calculated from beetles infested and non-infested sites. IVI was taken as raw data to draw DD curves.

**Key words:** DD curves, Relative dominance, IVI, Infested sites:

### INTRODUCTION

Dominant diversity (DD) curves are used to interpret the community organization in terms of resource share and niche space (Whittaker, 1965, 1975 and 1979; Woodwell and Smith 1969; Ralhan *et al.* 1982) Common logarithm of IVI of a given species were plotted for "y" and "x" axis is the rank of the most abundant to the rarest species. There are two extreme forms of DD curves, viz., the geometric series and the sigmoid lognormal. The geometric series is a consequence of constant proportional decrease in the importance from most to least important species. The sites in which the number of species is less follow the geometrical distribution whereas those sites in which the numbers of species are higher follow lognormal distribution.

### MATERIAL AND METHODS

The present study was done in the infested Sal Forest of Thano Range witnessing the mortality rate of 22-25%. Thus, keeping in view the extent of damage, four sites were chosen on the basis of their microclimatic differences and their intensity of attack, i.e., light (1%), Moderate (1-5 %) heavy (5-10%) and severely (above 10 %) attacked site.

The enumeration of attacked trees was done during the winter season in the month of December and January. Experimental plot of 1 hac. was selected for study in each site. Common logarithm of IVI of a given species was plotted for "y" and "x" axis is the rank of the most abundant to the rarest species. There are two extreme forms of DD curves viz., the geometric series and the sigmoid lognormal. The geometric series is a consequence of constant proportional decrease in the importance from most to least important species.

Dominance diversity (DD) structure was drawn by plotting the log transformed importance value on the ordinate against species sequence "from most to least important" on the abscissa.

## RESULTS AND DISCUSSION

When the intensity of attack was light, it showed geometric distribution followed by top two species (*S. robusta* and *M. philippinensis*) clearly indicates that these species are dominating the site and utilizing more than  $\frac{2}{3}$  of the total available resources as indicated by IVI values. Both shrub and herb layer were showing lognormal distribution and thus showing high diversity, disturbance and competition for sharing the available resources. Where Intensity of attack was low (1-5%), *S. robusta* was the most dominant plant species and as described earlier was making full use of its dominance by utilizing maximum available resources. Rests of the 18 species ( Table-1 and Fig.1) were following lognormal distribution. In case of shrubs, two lognormal distributions were evident. First between the top three species and second between rests of the 27 species. The log normal distribution shows that the site is highly heterogeneous and disturbed. Lognormal distribution indicating high disturbance heterogeneity and adaptability was shown by the herb layer. The site where the intensity was medium (5-10%) three tier patterns were evident from tree layer of Thano (heavy) site. First pattern (geometric) was shown by two topmost species (*Shorea* and *Mallotus* ), second (lognormal) by next five species and third (log-normal) by rest of the six species. This clearly indicates that the site is distributed or conditioned in three layers of associations for the resource utilization. Both shrub and herb layers were showing log normal distribution. When the intensity of attack was high (10%), all the eleven tree species were showing log-normal distribution. The log-normal distribution results as a consequence of the central limit theorem (May, 1975). The theorem states that when a large number of factors act to

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<i>Desmodium pulchellum</i>	36.88	0.00	70.63	0.00
<i>Diospyros tomentosa</i>	2.93	5.24	15.31	0.00
<i>Ehretia laevis</i>	8.93	3.01	9.06	0.00
<i>Flacourtia indica</i>	0.78	34.32	0.00	0.00
<i>Flemingia chappar</i>	6.74	15.56	3.75	0.00
<i>Grewia elastica</i>	1.50	0.00	2.89	0.00
<i>Holarrhena antidysenterica</i>	13.70	13.49	25.66	62.49
<i>Ichnocarpus frutiscens</i>	0.00	0.00	2.81	0.00
<i>Jasminum pubescens</i>	0.00	1.13	0.00	0.00
<i>Lagerstroemia parviflora</i>	2.78	0.00	6.73	0.00
<i>Limonia crenulata</i>	0.70	1.14	3.63	44.57
<i>Mallotus philippinensis</i>	26.29	57.24	23.62	0.00
<i>Miliusa velutina</i>	4.59	0.00	6.22	0.00
<i>Milletia auriculata</i>	20.63	0.00	42.32	6.40
<i>Murraya koeniji</i>	11.60	31.45	3.62	69.29
<i>Lantana camara</i>	0.00	0.00	0.00	0.00
<i>Ougenia oojenensis</i>	0.69	0.00	0.00	0.00
<i>Pogostemon nepalense</i>	0.00	7.60	0.00	0.00
<i>Rauwolfia serpentina</i>	0.00	0.00	0.00	0.00
<i>Rhamnus virgata</i>	0.00	1.07	0.00	0.00
<i>Rubus nivens</i>	0.56	2.66	0.00	0.00
<i>Saccharum munja</i>	0.00	0.00	2.81	0.00
<i>Scleichera oleosa</i>	2.49	0.00	0.00	0.00
<i>Shorea robusta</i>	3.53	15.40	10.57	0.00
<i>Sida acuta</i>	0.00	1.08	0.00	0.00
<i>Solanum viarum</i>	0.00	4.91	0.00	0.00
<i>Sterculia pallens</i>	0.00	0.00	2.85	0.00
<i>Smilax prolifera</i>	0.00	0.00	0.00	0.00
<i>Urena lobata</i>	0.80	1.77	0.00	0.00
<i>Urtica dioica</i>	0.00	0.98	0.00	0.00
<i>Zizyphus mauritiana</i>	0.82	3.93	0.00	0.00
	<b>Importance Value Index-Herb layer</b>			
<b>Name of species</b>	<b>Light attack</b>	<b>Moderate attack</b>	<b>Heavy attack</b>	<b>Severe attack</b>
<i>Achyranthes aspara</i>	1.62	4.07	0.00	4.66
<i>Adiantum venustum</i>	7.71	2.34	17.99	2.31
<i>Aegle marmelos</i>	4.75	0.00	0.00	2.89
<i>Aerua scandens</i>	4.62	3.00	7.26	12.13
<i>Ageratum conyzoides</i>	1.14	2.42	2.56	1.68
<i>Bidens licera</i>	0.00	0.00	0.00	0.00
<i>Callicarpa macrophylla</i>	0.00	0.00	0.00	0.00
<i>Capparis zeylanica</i>	0.00	0.00	0.00	0.00
<i>Caryopteris wallichiana</i>	0.00	3.11	0.00	0.00
<i>Cassia fistula</i>	1.85	2.86	7.26	2.29
<i>Cassia tora</i>	29.72	14.88	18.34	134.34
<i>Cissampelos pareira</i>	0.00	2.43	0.00	0.00
<i>Clematis gauriana</i>	0.00	0.00	0.00	0.00
<i>Clerodendron viscosum</i>	28.59	10.55	17.31	7.56
<i>Colebrookia oppositifolia</i>	1.27	3.29	3.77	0.00
<i>Crotalaria albida</i>	0.00	0.00	9.52	0.00
<i>Cryptolepis buchmani</i>	0.64	0.00	0.00	0.00
<i>Derris scandens</i>	0.92	0.00	0.00	0.00
<i>Desmodium pulchellum</i>	2.33	2.95	3.57	3.87

<i>Dioscorea prolifera</i>	1.11	2.86	2.36	0.00
<i>Diospyros tomentosa</i>	4.08	3.97	2.71	0.00
<i>Ehretia laevis</i>	4.09	12.43	6.26	0.00
<i>Eupatorium glandulosum</i>	1.31	0.00	0.00	0.00
<i>Flemingia chappar</i>	20.75	46.78	13.03	0.00
<i>Grewia elastica</i>	2.49	0.00	0.00	0.00
<i>Gymnema tingens</i>	1.51	0.00	0.00	0.00
<i>Holarrhena antidysenterica</i>	5.51	9.99	3.88	0.00
<i>Ichnocarpus fruticens</i>	2.32	2.70	0.00	9.03
<i>Jasminum pubescens</i>	0.00	5.68	0.00	0.00
<i>Justica simplex</i>	25.44	30.27	36.37	26.27
<i>Lagerstroemia parviflora</i>	0.00	0.00	6.26	0.00
<i>Mallotus philippinensis</i>	4.62	0.00	8.23	5.11
<i>Milusa velutina</i>	21.47	0.00	6.26	0.00
<i>Milletia auriculata</i>	4.75	0.00	6.83	0.00
<i>Murraya koeniji</i>	3.69	9.75	6.74	5.25
<i>Oplismenus compositus</i>	24.61	10.31	3.37	0.00
<i>Ougenia oojenensis</i>	1.30	0.00	0.00	0.00
<i>Oxalis corniculata</i>	1.87	2.57	0.00	0.00
<i>Phyllanthus emblica</i>	0.00	5.11	0.00	0.00
<i>Rauwolfia serpentina</i>	0.00	6.86	0.00	0.00
<i>Rhamnus virgata</i>	0.00	7.26	0.00	0.00
<i>Saccharum munja</i>	0.00	0.00	4.79	41.14
<i>Saccharum spontaneum</i>	0.00	0.00	2.76	0.00
<i>Sclleichera oleosa</i>	2.91	0.00	4.77	0.00
<i>Shorea robusta</i>	63.04	22.13	21.31	0.00
<i>Sida acuta</i>	15.48	61.32	77.41	41.47
<i>Sida rhombifolia</i>	0.00	0.00	0.00	0.00
<i>Smilax prolifera</i>	1.46	0.00	0.00	0.00
<i>Solanum erianthum</i>	0.00	8.11	0.00	0.00
<i>Vallis solanaceae</i>	1.01	0.00	0.00	0.00

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