PHYTO - SOCIOLOGICAL STUDIES OF WEEDS IN GROUNDNUT FIELDS OF ANANTAPURAM DISTRICT, ANDHRA PRADESH, INDIA.

DR. A. LAKSHMAIAH,
Associate Professor,
Department of Botany,
Govt. Degree College,
Pattikonda, Kurnool Dist,
(AP) INDIA

This article presents on overview of Phyto-sociological studies of weeds of groundnut fields of Anantapuram district, Andhra Pradesh. The weed species encountered in the groundnut fields during the four phases of the study i.e, Pre-plough, 15 days, 45 days and 60 days are recorded. All the quantitative characters abundance, density, frequency were determined for all the weed species encountered during four phases of the crop A total of 40 weed taxa exclusively in habit in the rainfed crop i.e. ground nut crop. The weeds of the groundnut fields were studied for the quantitative characters, it is observed that Physalis minima Cyperus rotundues are found to be the most important weeds. The key objective of the study is provision of quantitative characters of groundnut fields weeds in Anantapuram district.

Key words: *Agrestals, Gregarious weeds, crop productivity, Phytosociology, Quedrates.*

INTRODUCTIUON

A weed is a plant 'out of place' or a plant growing where it is not wanted while all weeds are unwanted plants, all unwanted plants may not be weeds from the point of agro-ecological systems, those plants which are competing with agricultural crops and having short vegetative phase and high reproductive output are termed as weeds. They are able to grow in adverse habitats and easily invade agricultural fields, which are very fertile and a favourite ground for their colonization. Enormous seed production and power of vegetative propagation make them immortal in agro-ecosystems. Weeds deplete large quantities of mineral nutrients and moisture more efficiently than the crop plants and thrive better over the crops in drought conditions. Weeds have higher contents of nutrients than crop plants, they grow faster and absorlo nutrients more efficiently. Reduction in crop yield has a direct correlation with weed competition. Depending on the degree of competition, weeds reduce crop yields by 10-25%. In tropical countries like India, the yield loss has been estimated to

the tune of 30%. In general, One kilogram of weed growth corresponds to a reduction in one kilogram of crop growth. Besides affecting the yield of crops, weeds can affect the quality of crops.

Despite of using modern mechanical methods, weeds are still posing major problems to agricultural productivity throughout the world. One of the most important reasons for the success of weeds is attributed for their biodiversity. The information on the Phyto-sociological studies of weeds species in groundnut crop in different cropping systems of the district is a prerequisite for effective weed management, the present study hold immense significance.

MATERIAL AND METHODS:

Phyto-sociological studies were adopted for the weeds of groundnut crop from rainfed area. Groundnut is the most dominant crop of the region, having crop duration of 105-110 days. The studies were conducted during Kharif season. There field sites for the crop within a radius of 5 Km were identified.

All the weeds encountered in the sample plots were carefully collected and identified. Randam quadrat method was adopted for studying Phyto-sociological attributes of weeds. In each field site, 5 quadrats of 50 cm2 were laid down and hence a sum of 15 quadrates. All the weeds from each quadrat were collected separately in Polythene bags. The quadrates were laid down four times based on their Phenology and crop duration. The four phases of study are pre-plough, 15 days, 45 days and before harvest (60 days). All the plant species encountered in quadrates were identified following ' Flora of Presidency of madras' (Gamble & Fischer 1915-1935), and other state, regional and local floras. All the plant families are arranged, in sequence following Bentham & Hooker's classification (1862-83) and listed in

Table 1

Tabel- 1: Analysis of weed Taxa and Families of Ground nut crop of Anantapuram District.

S.No.	Taxon	Family
1	Cleome gynandra	Cleomaceae
2	Cleome monophylla	Cleomaceae
3	Cleome viscosa	Cleomaceae
4	Sida acuta	Malvaceae
5	Corchorus aestuans	Tiliaceae
6	Tribulus terrestris	Zygophyllaceae
7	Cardiospermum helicacabun	Sapindaceae
8	Alysicarpus monilifer	Fabaceae
9	Clitoria ternatea	Fabaceae
10	Tephrosia purpurea	Fabaceae
11	Trianthema portulacastrum	Aizoaceae
12	Gisekia Pharnaceoides	Molluginaceae
13	Parthenium hysterophorus	Asteraceae

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14	Tridax procumbens	Asteraceae
15	Trichodesma indicum	Boraginaceae
16	Evolvules alsinoides	Convolvulaceae
17	Physalis minima	Solanaceae
18	Striga angustifolia	Scrophulariaceae
19	Martynia annua	Pedaliaceae
20	Pedalium murex	Pedaliaceae
21	Sesamum alatum	Pedaliaceae
22	Lepidagathis cristata	Acanthaceae
23	Leucas aspera	Lamiaceae
24	Ocimum americanum	Lamiaceae
25	Achyranthus aspera	Amaranthaceae
26	Celosia argentea	Amaranthaceae
27	Digera muricata	Amaranthaceae
28	Gomphrena sessata	Amaranthaceae
29	Acalypha indica	Euphorbiaceae
30	Croton bon-plandianum	Euphorbiaceae
31	Euphorbia hirta	Euphorbiaceae
32	Phyllanthus amarus	Euphorbiaceae
33	Commelina benghalensis	Commelinaceae
34	Cyperus rotundus	Cyperaceae
35	Brachiaria eruciformis	Poaceae
36	Brachiaria reptans	Poaceae
37	Chloris inflate	Poaceae
38	Dacyloctenium aegyptium	Poaceae
39	Digitaria bicornis	Poaceae
40	Eragrostis viscosa	Poaceae

The phytosociological attributes: abundance, density and frequency and their relative values and Importance Value Index (IVI) are calculated following the principles of Curtis and McIntosh (1950), Misra (1968) and Mueller-Dombois and Ellenberg (1974).

$$\text{Abundance} = \frac{\text{Total number of individuals of each species}}{\text{Total number of sampling units in which species occurred}}$$

$$\text{Density} = \frac{\text{Total number of individuals in all sampling units}}{\text{Total number of sampling units studied}}$$

$$\text{Frequency (\%)} = \frac{\text{Number of sampling units in which species occur}}{\text{Total number of sampling units}} \times 100$$

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Importance Value Index = Relative Density + Relative Frequency + Relative Dominance

$$\textbf{Relative value} \quad = \quad \frac{\text{Value of individual species}}{\text{Total values of all species}}$$

Based on Raunkiaer (1934), the frequency classes of weed species were determined. Accordingly there are 5 frequency classes, i.e. 'A' class with the species of frequency ranging from 1-20%; 'B' class 21-40%; 'C' class 41-60%; 'D' class 61-80%; and 'E' class 81-100%. Further the weed community frequency patterns were compared with the normal frequency pattern of Raunkiaer (A>B>C>=<D<E). Based on the frequency pattern of the community, the homogeneity and heterogeneity of the vegetation. If the values are high with respect to B, C and D, then the community is said to be heterogeneous where as higher values of E indicates the homogenous nature.

RESULTS AND DISCUSSION:

The data pertaining to abundance, density, frequency and their relative values, A/F ratio for determining the distribution pattern and Importance value Index (IVI) of the weeds encountered in groundnut crop fields are provided in Table.

A total of 40 weed species were recorded in all 15 quadrats combining all phases of crop cycle. 31 species were present during pre-plough period of the crop, 25 species are recorded during the record phase (15 days) and after 45 days 33 species, where as it is 35 species after 60 days. Tridax procumbens is the most abundant species during pre-plough phase and after 15 days phase. Physalis minima is considered most abundant after 45 days and Sida acuta after 60 days. Cyperus rotundus is identified with maximum density in the pre-plough phase, after 15 days Physalis minima and the same species remained with maximum density after 45 and 60 days also.

Regarding the distribution patterns of the weed species, of the 31 species recorded in the pre-plough phase, 20 species have shown contagious distribution, one random and 10 species regular distribution pattern. Out of 21 species, 3 were found with random distribution, 7 with regular and 11 with contagious distribution during the second phase. In the third phase, out of 29 species, 17 have shown contagious. 7 with random and 5 were regular distribution pattern. After 60 days of the 30 species, 18 are found to be distributed contagiously, 10 regularly and 2 randomly.

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TABLE 2 : PHYTOSOCIOLOGICAL ATTRIBUTES OF GROUNDNUT CROP WEEDS - 1

S. No.	Name of the Species	Pre-plough				15 days				45 days				60 days			
		TNI	A	D	F%	TNI	A	D	F%	TNI	A	D	F%	TNI	A	D	F%
1	*Cleome gynandra*	4	1.00	0.27	26.66	-	-	-	-	-	-	-	-	3	1.00	0.20	20.00
2	*Cleome monophylla*	-	-	-	-	-	-	-	-	-	-	-	-	2	1.00	0.13	13.33
3	*Cleome viscosa*	8	1.60	0.53	33.33	10	1.67	0.67	40.00	2	1.00	0.13	13.33	5	1.25	0.33	26.67
4	*Sida acuta*	2	2.00	0.13	6.66	-	-	-	-	1	1.00	0.07	6.67	2	2.00	0.13	6.67
5	*Corchorus aestuans*	2	1.00	0.13	13.33	-	-	-	-	2	1.00	0.13	13.33	1	1.00	0.07	6.67
6	*Tribulus terrestris*	5	1.25	0.33	26.66	-	-	-	-	2	2.00	0.13	6.67	1	1.00	0.07	6.67
7	*Cardiospermum helicacabum*	1	1.00	0.07	6.66	1	1.00	0.07	6.67	2	2.00	0.13	6.67	-	-	-	-
8	*Alysicarpus monilifer*	1	1.00	0.07	6.66	3	1.50	0.20	13.33	-	-	-	-	1	1.00	0.07	6.67
9	*Clitoria ternatea*	1	1.00	0.07	6.66	1	1.00	0.07	6.67	1	1.00	0.07	6.67	-	-	-	-
10	*Tephrosia purpurea*	2	1.00	0.13	13.33	-	-	-	-	-	-	-	-	2	2.00	0.13	6.67
11	*Trianthema portulacastrum*	-	-	-	-	-	-	-	-	2	2.00	0.13	6.67	-	-	-	-
12	*Gisekia pharnaceoides*	-	-	-	-	2	1.00	0.13	13.33	1	1.00	0.07	6.67	2	1.00	0.13	13.33
13	*Parthenium hysterophorus*	2	2.00	0.13	6.66	4	1.00	0.27	26.67	4	1.33	0.27	20.00	4	1.33	0.27	20.00
14	*Tridax procumbens*	3	3.00	0.20	6.66	6	2.00	0.40	20.00	2	1.00	0.13	13.33	2	1.00	0.13	13.33
15	*Trichodesma indicum*	1	1.00	0.07	6.66	-	-	-	-	-	-	-	-	-	-	-	-
16	*Evolvulus alsinoides*	3	1.50	0.20	13.33	-	-	-	-	1	1.00	0.07	6.67	1	1.00	0.07	6.67
17	*Physalis minima*	2	1.00	0.13	13.33	18	1.50	1.20	80.00	11	1.57	0.73	46.67	8	1.33	0.53	40.00
18	*Striga angustifolia*	1	1.00	0.07	6.66	-	-	-	-	2	1.00	0.13	13.33	1	1.00	0.07	6.67
19	*Martynia annua*	2	1.00	0.13	13.33	-	-	-	-	-	-	-	-	-	-	-	-
20	*Pedalium murex*	1	1.00	0.07	6.66	-	-	-	-	2	1.00	0.13	13.33	2	1.00	0.13	13.33

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21	*Sesamum alatum*	-	-	-	-	3	1.50	0.20	13.33	5	1.25	0.33	26.67	4	1.33	0.27	20.00
22	*Lepidagathis cristata*	2	2.00	0.13	6.66	1	1.00	0.07	6.67	-	-	-	-	-	-	-	-
23	*Leucas aspera*	8	1.33	0.53	40.00	5	1.67	0.33	20.00	3	1.50	0.20	13.33	-	-	-	-
24	*Ocimum americanum*	2	1.00	0.13	13.33	1	1.00	0.07	6.67	-	-	-	-	-	-	-	-
25	*Achyranthus aspera*	-	-	-		-	-	-	-	3	1.50	0.20	13.33	2	1.00	0.13	13.33
26	*Celosia argentea*	8	1.60	0.53	33.33	12	1.71	0.80	46.67	6	1.20	0.40	33.33	6	1.20	0.40	33.33
27	*Digera muricata*	9	1.50	0.60	40.00	10	1.67	0.67	40.00	4	1.00	0.27	26.67	4	1.00	0.27	26.67
28	*Gomphrena serrata*	2	2.00	0.13	6.66	-	-	-	-	-	-	-	-	-	-	-	-
29	*Acalypha indica*	-	-	-		-	-	-	-	2	2.00	0.13	6.67	2	1.00	0.13	13.33
30	*Croton bon-plandianum*	9	1.00	0.60	60.00	6	1.50	0.40	26.67	7	1.40	0.47	33.33	6	1.50	0.40	26.67
31	*Euphorbia hirta*	-	-	-		9	1.13	0.60	53.33	5	1.00	0.33	33.33	4	1.33	0.27	20.00
32	*Phyllanthus amarus*	6	1.50	0.40	26.66	9	1.13	0.60	53.33	4	1.33	0.27	20.00	5	1.67	0.33	20.00
33	*Commelina benghalensis*	5	1.66	0.33	20.00	6	1.50	0.40	26.67	6	1.50	0.40	26.67	3	1.50	0.20	13.33
34	*Cyperus rotundus*	18	1.20	1.20	100.00	7	1.17	0.47	40.00	10	1.25	0.67	53.33	5	1.25	0.33	26.67
35	*Brachiaria eruciformis*	2	1.00	0.13	13.33	-	-	-	-	2	1.00	0.13	13.33	-	-	-	-
36	*Brachiaria reptans*	6	1.25	0.40	26.66	-	-	-	-	-	-	-	-	1	1.00	0.07	6.67
37	*Chloris inflata*	-	-	-		-	-	-	-	-	-	-	-	2	1.00	0.13	13.33
38	*Dactyloctenium aegyptium*	-	-	-		-	-	-	-	2	1.00	0.13	13.33	3	1.50	0.20	13.33
39	*Digitaria bicornis*	1	1.00	0.07	6.66	1	1.00	0.07	6.67	3	1.00	0.20	20.00	4	1.00	0.27	26.67
40	*Eragrostis viscosa*	1	1.00	0.07	6.66	3	1.00	0.20	20.00	4	1.00	0.27	26.67	3	1.00	0.20	20.00

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TNI = Total Number of Individuals	
A = Abundance	
D = Density	
F = Frequency	

IVI of individual weed species encountered in the groundnut crop fields identified cyperus rotundus as the most important species during the pre-plough phase followed by Croton-bon-plandianum. After 15 days, Physalis minima has become the most important weed followed by celosia argentia. After 45 days again phycalis minima appeared once again as important species followed by celosia argentea after 60 days. From the above results, it is clear that Physalis minima and cyperces rotundues are the most important weeds in the ground nut fields (Table 3)

S. No.	Name of the Species	Pre-plough					15 days					45 days					60 days				
		RD	RF	RDom	IVI	A/F	RD	RF	RDom	IVI	A/F	RD	RF	RDom	IVI	A/F	RD	RF	RDom	IVI	A/F
1	*Cleome gynandra*	2.74	3.57	1.98	8.30	0.04	-	-	-	-	-	-	-	-	-	-	3.00	3.61	2.40	9.01	0.05
2	*Cleome monophylla*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.00	2.41	2.40	6.81	0.08
3	*Cleome viscosa*	5.48	4.46	3.18	13.12	0.05	8.00	6.67	5.11	19.78	0.04	1.83	2.30	2.37	6.50	0.08	5.00	4.82	3.00	12.81	0.05
4	*Sida acuta*	1.37	0.89	3.97	6.23	0.30	-	-	-	-	-	0.92	1.15	2.37	4.44	0.15	2.00	1.20	4.80	8.00	0.31
5	*Corchorus aestuans*	1.37	1.79	1.98	5.14	0.08	-	-	-	-	-	1.83	2.30	2.37	6.50	0.08	1.00	1.20	2.40	4.60	0.15
6	*Tribulus terrestris*	3.43	3.57	2.48	9.48	0.05	-	-	-	-	-	1.83	1.15	4.74	7.73	0.32	1.00	1.20	2.40	4.60	0.15
7	*Cardiospermum helicacabum*	0.69	0.89	1.98	3.56	0.15	0.80	1.11	3.06	4.98	0.15	1.83	1.15	4.74	7.73	0.30	-	-	-	-	-
8	*Alysicarpus monilifer*	0.69	0.89	1.98	3.56	0.15	2.40	2.22	4.60	9.22	0.11	-	-	-	-	-	1.00	1.20	2.40	4.60	0.15
9	*Clitoria ternatea*	0.69	0.89	1.98	3.56	0.15	0.80	1.11	3.06	4.98	0.15	0.92	1.15	2.37	4.44	0.15	-	-	-	-	-
10	*Tephrosia purpurea*	1.37	1.79	1.98	5.14	0.08	-	-	-	-	-	-	-	-	-	-	2.00	1.20	4.80	8.00	0.30
11	*Trianthema portulacastrum*	-	-	-	-	-	-	-	-	-	-	1.83	1.15	4.74	7.73	0.30	-	-	-	-	-
12	*Gisekia pharnaceoides*	-	-	-	-	-	1.60	2.22	3.06	6.89	0.08	0.92	1.15	2.37	4.44	0.15	2.00	2.41	2.40	6.81	0.08

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No	Name																			
13	*Parthenium hysterophorus*	1.37	0.89	3.97	6.23	0.30	3.20	4.44	3.06	10.71	0.04	3.67	3.45	3.16	10.28	0.07	4.00	3.61	3.20	10.81	0.07
14	*Tridax procumbens*	2.06	0.89	5.95	8.90	0.45	4.80	3.33	6.13	14.26	0.10	1.83	2.30	2.37	6.50	0.08	2.00	2.41	2.40	6.81	0.08
15	*Trichodesma indicum*	0.69	0.89	1.98	3.56	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	*Evolvulus alsinoides*	2.06	1.79	2.98	6.82	0.11	-	-	-	-	-	0.92	1.15	2.34	4.44	0.15	1.00	1.20	2.40	4.60	0.15
17	*Physalis minima*	1.37	1.79	1.98	5.14	0.08	14.41	13.33	4.60	32.34	0.02	10.09	8.05	3.73	21.86	0.00	8.00	7.23	3.20	18.42	0.03
18	*Striga angustifolia*	0.69	0.89	1.98	3.56	0.15	-	-	-	-	-	1.83	2.30	2.37	6.50	0.08	1.00	1.20	2.40	4.60	0.15
19	*Martynia annua*	1.37	1.79	1.98	5.14	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	*Pedalium murex*	0.69	0.89	1.98	3.56	0.15	-	-	-	-	-	1.83	2.30	2.37	6.50	0.08	2.00	2.41	2.40	6.81	0.08
21	*Sesamum alatum*	-	-	-	-	-	2.40	2.22	4.60	9.2	0.11	4.59	4.60	2.96	12.15	0.05	4.00	3.61	3.20	10.81	0.07
22	*Lepidagathis cristata*	1.37	0.89	3.97	6.23	0.30	0.80	1.11	3.06	4.98	0.15	-	-	-	-	-	-	-	-	-	-
23	*Leucas aspera*	5.48	5.36	2.64	13.48	0.03	4.00	3.33	5.11	12.44	0.08	2.75	2.30	3.56	8.61	0.11	-	-	-	-	-
24	*Ocimum americanum*	1.37	1.79	1.98	5.14	0.08	0.80	1.11	3.06	4.98	0.15	-	-	-	-	-	-	-	-	-	-
25	*Achyranthus aspera*	-	-	-	-	-	-	-	-	-	-	2.75	2.30	3.56	8.61	0.11	2.00	2.41	2.40	6.81	0.08
26	*Celosia argentea*	5.48	4.46	3.18	13.12	0.05	9.60	7.78	5.25	22.64	0.04	5.50	5.75	2.85	14.09	0.04	6.00	6.02	2.88	14.90	0.04
27	*Digera muricata*	6.17	5.36	2.98	14.50	0.04	8.00	6.67	5.11	19.78	0.04	3.67	4.60	2.37	10.64	0.04	4.00	4.82	2.40	11.22	0.04
28	*Gomphrena serrata*	1.37	0.89	3.97	6.23	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	*Acalypha indica*	-	-	-	-	-	-	-	-	-	-	1.83	1.15	4.74	7.73	0.30	2.00	2.41	2.40	6.81	0.08
30	*Croton bonplandianum*	6.17	8.04	1.98	16.19	0.02	4.80	4.44	4.60	13.84	0.06	6.42	5.75	3.32	15.49	0.04	6.00	4.82	3.60	14.41	0.06
31	*Euphorbia hirta*	-	-	-	-	-	7.20	8.89	3.45	19.54	0.02	4.59	5.75	2.37	12.70	0.03	4.00	3.61	3.20	10.81	0.07
32	*Phyllanthus amarus*	4.11	3.57	2.98	10.66	0.06	7.20	8.89	3.45	19.54	0.02	3.67	3.45	3.16	10.28	0.07	5.00	3.61	4.00	12.61	0.08
33	*Commelina benghalensis*	3.43	2.68	3.29	9.40	0.08	4.80	4.44	4.60	13.84	0.06	5.50	4.60	3.56	13.66	0.06	3.00	2.41	3.60	9.01	0.11
34	*Cyperus rotundus*	12.33	13.40	2.38	28.11	0.01	5.60	6.67	3.58	15.84	0.03	9.17	9.20	2.96	21.33	0.02	5.00	4.82	3.00	12.81	0.05
35	*Brachiaria eruciformis*	1.37	1.79	1.98	5.14	0.08	-	-	-	-	-	1.83	2.30	2.37	6.50	0.08	-	-	-	-	-
36	*Brachiaria reptans*	4.11	3.57	2.48	10.16	0.05	-	-	-	-	-	-	-	-	-	-	1.00	1.20	2.40	4.60	0.15

37	Chloris inflata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.00	2.41	2.40	6.81	0.08
38	Dactyloctenium aegyptium	-	-	-	-	-	-	-	-	-	1.83	2.30	2.37	6.50	0.08	3.00	2.41	3.60	9.01	0.11
39	Digitaria bicornis	0.69	0.89	1.98	3.56	0.15	0.80	1.11	3.06	4.98	0.15	2.75	3.45	2.37	8.57	0.05	4.00	4.82	2.40	11.22	0.04
40	Eragrostis viscosa	0.69	0.89	1.98	3.56	0.15	2.40	3.33	3.06	8.80	0.05	3.67	4.60	2.37	10.64	0.04	3.00	3.61	2.40	9.01	0.05

RD = Relative Density
RF = Relative Frequency
RDom = Relative Abundunce
IVI = Importance Value Index

The analysis on the frequency classes of the wed species encountered in groundnut revealed interesting results. In the first phase, out of 31 species, 'A' class is represented by 21 species followed by 8 under 'B' 3 in 'C' and one in 'D' class. Out of 29 species recorded in third phase, 'A' represented by 20 followed by 7 in 'B' and 2 in 'C' class. In fourth phase, out of 30 species, 23 were under 'A' and 7 under 'B' class. No single species under C,D and E categories, showing the heterogeneity of weed vegetation. Based on the Phyto-sociological analysis of the weeds, it is observed that the critical periods for the groundnut crop is 30 – 60 days. Weed management should be done during these periods of the crop cycle.

Table: 4 Frequency classes of weed species

Frequency class	Phase			
	I	II	III	IV
A 1 – 20	21	12	20	23
B 21 – 40	8	5	7	7
C 41 – 60	1	3	2	-
D 61 – 80	-	1	-	-
E 81 – 100	1	-	-	-
	31	**21**	**29**	**30**

Frequency Formulae

I A>B>C>D<E
II A>B>C>D<E
III A>B>C>D=E
IV A>B>C=D=E

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