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Evaluation of Groundnut (*Arachis hypogaea* L.) Varieties under Low and Mid-Hills of North Eastern Hills Region

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Abstract

Experiment was conducted at low (600 m from msl, Basar, Arunachal Pradesh) and mid-hills (900 m from msl, Umiam, Meghalaya) of north eastern hills region of India to evaluate eighteen groundnut varieties (SB XI, JL 220, Girnar-1, DRG-17, UF-70-103, TKG-19A, RG-141, GG-2, NRCG-1308, TMV-2, ICGS-76, HNG-10, CO-1, NRCG-7599, ALR-2, Kisan, SG-84 and AK-12-24) for suitable cultivation. The varieties NRCG-1308 followed by ALR-2, JL-220, SB XI and SG-84 are found suitable for low hills and the varieties JL 220 followed by Girnar-1, SG-84, DRG-17 and ICGS-76 are found suitable for mid-hills of this region. The oil content varied from 42.47% in the variety ICGS-76 to 48.97% in Kisan. The oil yield was found to be highest (6.733 q/ha) in the variety JL 220 averaged over years and locations.
Key words : Groundnut, *Arachis hypogaea* L., North Eastern Hills, Varieties.

Groundnut (*Arachis hypogaea* L.) occupies a place of pride in India as an edible oilseed crop considering its acreage and total production (1). Out of the nine oilseed crops (groundnut, rapeseed-mustard, sesamum, sunflower, safflower, soybean, linseed, castor and niger) grown in India, groundnut occupies 45% of the total oilseed area and 55% of the total oilseed production. However the area under groundnut in north eastern hill (NEH) region of India is small (around 4,000 ha) considering its potential as an oilseed and soil binding crop in the region. Large-scale cultivation of this crop will restore the fragile soil health in the upland/jhum lands by its soil binding action and nitrogen fixation. Adoption of new cultivars and better management practices can increase the yield (2). Improved cultivars alone can enhance productivity by 10 to 50% in crop plants (3). The sustainable yield index (SYI) was higher when groundnut is included in the cropping sequence. The SYI was greater in groundnut-groundnut (0.673) and low in the groundnut-mustard (0.376) system (4). There is lack of information regarding the best cultivars for different altitudes of the region ; therefore the present investigation was carried out keeping these in view aspects that the crop can be successfully and profitably cultivated upto mid-altitudes of the region (5).

Methods

The field experiment was conducted during the rainy seasons of 2006 and 2007 at ICAR Research Complex for NEH Region, Arunachal Pradesh (Basar) and Meghalaya (Umiam) at low (600 m msl) and mid (900 m msl) hills respectively. The soil of the experimental sites was acidic in reaction and high in organic carbon at both the sites. Eighteen groundnut varieties (SB XI, JL 220, Girnar-1, DRG-17, UF-70-103, TKG-19A, RG-141, GG-2, NRCG-1308, TMV-2, ICGS-76, HNG-10, CO-1, NRCG-7599, ALR-2, Kisan, SG-84 and AK-12-24) of 120-130 days duration were sown in mid of May 2006 and 2007 at Basar and Umiam with a spacing of 40 cm row to row and 20 cm plant to plant in three replications in a randomized block design. The crop was supplied with 5.0 t/ha of FYM before sowing and 20 : 40 : 40 kg N : P_2O_5 : K_2O/ha respectively during the time of sowing. The necessary crop management practices like weeding, earthing up were followed for all the varieties during the crop growth. Observations on number of plants/plot, pod yield (kg/plot), haulm yield (kg/plot), number of pods/plant were recorded. Since there was a variation in number of plants/plot, co-variance analysis was done following standard procedure (6). Yield of pod and haulm were taken on dry weight basis (7% moisture) and converted into q/ha by multiplying with suitable conver-

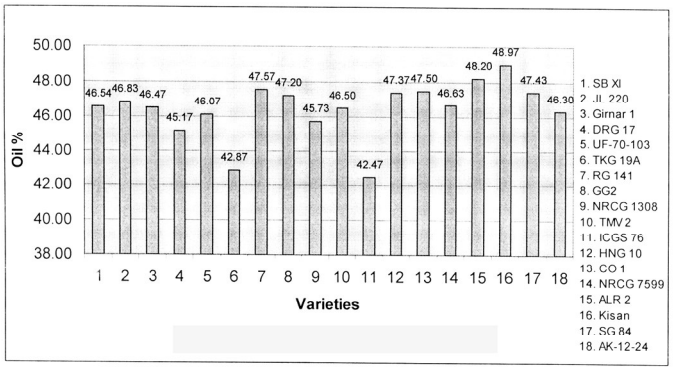

Figure 1. Oil content (%) in different varieties.

sion factor. Number of pods/plant was calculated from average of ten plants selected randomly from each plot.

The co-variance analysis of plant population with pod and stover yield at both low and mid-hills was significant therefore the adjusted yields were calculated and compared for all the varieties. The results indicate that the use of plant population as the covariate has increased the precision in pod and haulm yield by 11.8—87.5% and 12.6—15.7% respectively.

The oil content in each variety was determined gravimetrically by extracting the meal (20 g) with n-hexane in a Soxhlet extraction assembly for over 6 hours as per standard procedure (7). The oil yield was calculated on the basis of oil content, shelling out turn and pod yield.

Results and Discussion

Pod and Haulm Yield

There was a significant variation of pod and

Table 1. Performance of groundnut genotypes at low altitude (Basar, Arunachal Pradesh).

Varieties	Population ('000/ha)	Actual pod yield (q/ha)	Adjusted pod yield (q/ha)	Actual haulm yield (q/ha)	Adjusted haulm yield (q/ha)	No. of pods/ plant	Shelling (%)	100-kernel wt (g)
SB XI	120.0	19.2	18.0	26.7	25.0	24	67.61	52.91
JL 220	73.3	15.8	18.2	29.2	32.6	28	64.02	54.01
Girnar-1	126.7	15.8	14.1	35.0	32.6	19	61.62	44.50
DRG-17	120.0	10.8	9.6	14.2	12.5	12	70.75	46.62
UF-70-103	80.0	15.0	16.9	13.3	16.0	16	58.86	62.56
TKG 19A	103.3	11.7	11.6	22.5	22.6	15	66.04	67.85
RG 141	130.0	13.4	11.5	23.3	20.5	17	76.15	54.24
GG-2	93.3	15.0	15.9	15.0	16.2	26	69.95	40.04
NRCG-1308	136.7	23.3	20.8	38.3	34.8	25	71.71	46.68
TMV-2	86.7	13.3	14.7	24.2	26.2	19	70.96	38.58
ICGS-76	116.7	9.2	8.3	16.7	15.4	14	68.37	73.29
HNG-10	73.3	15.0	17.4	27.5	30.9	24	68.68	58.93
CO-1	150.0	15.8	12.3	31.7	26.7	26	64.25	39.84
NRCG-7599	90.0	9.2	10.3	15.0	16.6	18	68.94	56.77
ALR-2	100.0	20.0	20.3	29.2	29.7	28	67.17	46.51
Kisan	63.3	10.8	14.0	14.2	18.7	27	68.78	41.06
SG-84	120.0	19.2	18.0	15.8	14.1	20	69.56	50.16
AK-12-24	100.0	15.8	16.1	18.3	18.8	16	68.93	61.43
CD (0.05)	-	-	0.30	-	0.50	6.0	-	-
CV (%)	-	-	28.69	-	26.08	17.97	-	-

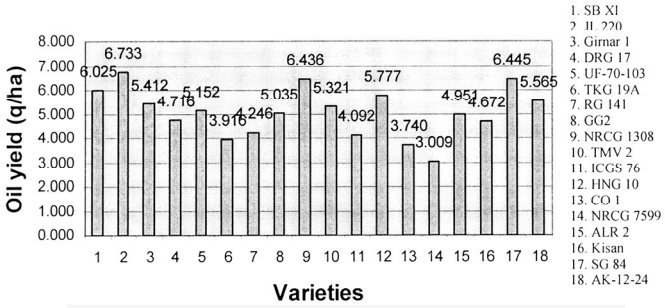

Figure 2. Oil yield (q/ha) in different groundnut varieties.

haulm yield among varieties and with altitudes. The pod yield varied from 8.3 to 20.8 q/ha at low-hills, while the variation was 8.4 to 23.4 q/ha at mid-hills. The pod yields varied from 5.6 to 22.2 q/ha at Barapani, Meghalaya (8). At low-hills highest pod yield was recorded in the variety NRCG-1308 (20.8 q/ha) followed by ALR-2 (20.3 q/ha), JL 220 (18.2 q/ha), SB XI (18.0 q/ha), SG-84 (18.0 q/ha) (Table 1). At mid-hills the variety JL 220 produced highest pod yield of 23.4 q/ha followed by Girnar-1 (20.1 q/ha), SG-84 (19.9 q/ha), DRG-17 (19.4 q/ha), ICGS-76 (18.6 q/ha) (Table 2). At Pantnagar highest pod yield of 26.4 q/ha has been observed in variety SG-84 (9). Similarly the haulm yield was highest in the variety NRCG-1308 (34.8 q/ha) which was significantly superior over JL 220 and Girnar-1, however the latter varieties were at par with respect to this character at low hills. At mid-hills highest haulm yield was recorded in the variety Girnar-1 (34.0 q/ha) which was significantly superior over all other varieties.

Table 2. Performance of groundnut genotypes at mid-altitude (Umiam, Meghalaya).

Varieties	Population ('000/ha)	Actual pod yield (q/ha)	Adjusted pod yield (q/ha)	Actual haulm yield (q/ha)	Adjusted haulm yield (q/ha)	No. of pods/ plant	Shelling (%)	100-kernel wt (g)
SB X1	56.8	19.3	18.2	19.5	18.1	33	75.55	59.24
JL 220	40.8	21.0	23.4	21.9	25.0	38	74.32	60.00
Girnar-1	56.3	21.1	20.1	35.3	34.0	39	74.40	45.71
DRG-17	65.3	22.4	19.4	33.5	29.7	39	73.21	47.27
UF-70-103	35.4	14.6	18.1	19.1	23.7	30	68.80	64.26
TKG 19A	33.2	12.2	16.3	17.6	22.9	31	65.11	65.68
RG-141	49.5	13.4	13.9	18.8	19.1	27	73.62	53.42
GG-2	58.2	15.0	13.6	21.0	19.2	27	74.70	43.26
NRCG 1308	47.0	16.4	17.5	27.1	28.4	36	75.36	49.94
TMV-2	58.8	18.2	16.7	26.4	24.4	31	75.00	49.00
ICGS-76	70.1	22.6	18.6	30.7	25.6	29	75.12	60.45
HNG-10	57.9	18.3	17.0	26.4	24.7	31	73.16	60.00
CO-1	56.9	11.5	10.4	21.9	20.5	29	74.45	49.49
NRCG-7599	52.3	8.6	8.4	14.3	14.1	23	68.74	50.03
ALR-2	42.9	7.1	9.0	24.2	26.7	27	72.87	41.53
Kisan	38.1	9.8	12.8	20.0	23.9	30	73.45	43.30
SG-84	57.5	21.1	19.9	21.7	20.1	29	74.00	56.95
AK-12-24	55.3	18.0	17.2	30.5	29.5	36	75.49	53.80
CD (0.05)	-	-	0.07	-	0.44	NS	-	-
CV (%)	-	-	13.65	-	22.91	26.25	-	-

Yield Attributing Characters

The number of pods/plant was highest (28) in the varieties JL 220 and ALR-2, which was at par with Kisan, GG-2, CO-1, NRCG-1308, SB XI and HNG-10 at low-hills of Arunachal Pradesh, however, at mid-hills of Meghalaya it varied from 23 (NRCG-7599) to 39 (Girnar-1 and DRG-17) but the variation was statistically non-significant.

The shelling out turn varied from 58.86% in the variety UF-70-103 to 71.71% in the variety NRCG 1308 at low hills of Arunachal Pradesh, whereas it varied from 65.11% in the variety TKG 19A to 75.55% in the variety SB XI at mid-hills of Meghalaya. The 100-kernel weight was below 50 grams in the varieties Girnar-1, DRG-17, GG-2, NRCG-1308, TMV-2, CO-1, ALR-2 and Kisan, whereas in the varieties SB XI, JL 220, RG 141, HNG-10, AK-12-24, NRCG 7599 and SG-84 it was 50 to 60 grams and it was more than 60 grams for the varieties UF-70-103, TKG 19A and ICGS-76. Similar findings of shelling out turn (65—70%) of the variety SB XI and 100 kernel weight of the variety TKG 19 (80—85 g) has been reported from Konkan region (10).

Oil Content and Oil Yield

Oil yield is the function of per cent oil content in the kernel, shelling per cent and pod yield. It is the most economic aspect for selection of a superior variety. The oil content varied from 42.47% in the variety ICGS-76 to 48.97% in Kisan (Fig. 1). The mean oil content was 46.43%. Mean oil content of 49.80% from 18 cultivars has been reported (11). Highest oil yield (Fig. 2) was observed in the variety JL 220 (6.733 q/ha) and lowest in the variety NRCG 7599 (3.009 q/ha).

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