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Yield Performance of Groundnut Varieties as Affected by Sowing Dates in Lower Khyber Pakhtunkhwa

Fayaz Ahmad* Alia* Amjad Khan Mohammad Naeem Akhtar Hussain
Oilseed Section Agricultural research Institute Mingora Swat

Abstract
A field experiment was conducted to study "Yield performance of groundnut varieties as affected by sowing dates in lower Khyber Pakhtunkhwa during kharif 2014 taking two promising varieties and different sowing dates. Results revealed that the number of pods plant $^{-1,}$ pod yield, Plant height days to maturity had significantly varied due to variation in dates of sowing. The maximum number of pods plant^{-1} and pod yield, plant height obtained when the crop was sown on 20th April. The study suggests that in Malakand division climate it is better to sow the groundnut crop within the first week of April.
Keywords: Groundnut, sowing dates, mat, pod yield.

Introduction:
Crop growth and production depend on a number of traits; though, environment plays the most important role. Among climatic factors solar radiation, temperature, humidity, rainfall is very essential. Groundnut is sensitive to climatic factors such as light and temperature. Reddy and Reddy (2001) reported that pod yield of groundnut was positively correlated with the total number of flower produced plant^{-1}, number of flowers plant^{-1} produced during the 1st month, number of pegs and pods plant^{-1} and 100- kernel weight. The crop sown late mature earlier, resulting in a reduced pod number and 100-kernel weight. Reddy and Suresh (2000) found that plant height was increased in the late sown crop, while dry matter accumulation at harvest was maximum when the crop was sown earlier. Karanjikar et al., (2004) defining the effects of sowing dates on the yield and its traits of groundnut cultivars observed that pod yield, shelling percentage and 100-kernel weight decreased with late sowing. Tavora et al., (2002) evaluated the effects of sowing time on the pod yield of eight groundnut cultivars and observed that highest-yielding cultivars of Virginia species 57422 and 7333 appeared to be the most unstable and unpredictable cultivars. Attarde et al., (2002) evaluated different varieties under different sowing dates, revealed that sowing of groundnut in mid-January produced significantly higher pod yield than on late January. Patra (1998) reported that groundnuts grown in mid-February gave more yield than 15 January and 15 March. Yield increased as irrigation frequency (1-3 irrigations) increased, from 1350 kg ha^{-1} when only irrigated at flowering to 2420 kg ha-1 when irrigated at flowering + pod initiation + pod development. Deka et al., (1997) conducted experiment on four groundnut cultivars sown in mid-October, mid-November and mid-December. Early sowing in mid-October proved significantly superior in plant height, branches plant^{-1}, number of developed pods plant^{-1}, dry matter accumulation plant^{-1}, pod weight plant-1, 100- pod weight, 100-seed weight and pod yield compared with sowing on mid-November and mid-December. On average, NRGS (E)-2 recorded the highest pod yield (1370 kg ha^{-1}), followed by SG-84 (1320 kg ha^{-1}), NRGS (E)-6 (1280 kg ha^{-1}) and ICPC (E)-6 (1250 kg ha^{-1}). Rajput and Mishra (1993) conducted field experiment on 6 groundnut cultivars sown on 15 or 30 Dec., 15 or 30 Jan. or 15 Feb. Pod yields were highest from crops sown on 30 Dec., and delaying sowing after this date decreased pod yields. Cultivar M-13 gave significantly higher pod yields. Similarly, Ahmad (1992) reported mean yield of 6 groundnut cultivars grown at Sonitpur in spring 1989 decreased from 1910 kg ha^{-1} when sown on 5 Jan. to 1300 kg ha^{-1} when sown on 15 March, while crops grown in the late rainy season with a 9 August sowing date gave mean pod yield of 980 kg ha^{-1}. Days to moderate flowering and harvesting decreased as the sowing date was delayed after 5th January. Mean cultivar yields ranged from 1320 kg ha^{-1} in ICGS44 to 1630 kg ha-1 in ICGS-I. There was a significant interaction between cultivars and sowing date. At the first sowing date, yield was high 2130 kg ha^{-1} in ICGS11, ICGS 44 and ICGS-I, and 1540-1750 kg ha^{-1} in ICGS5, ICG (FDRS) 4 and ICG (FDRS) 10. In the late rainy season the highest yield (1110 kg ha^{-1}) was produced by variety ICG (FDRS) 10. The present study was taken to identify the suitable sowing date for better growth and yield of groundnut crop, for commercial cultivation in the Province.

Material and methods
Two high yielding groundnut varieties Swat phalli -2000 and PG-1166 were planted in field at different sowing dates with 10 days interval viz. 20th April,30th April, 10th May,20th May 30th May and 10th June .The experiment was conducted during Kharif 2014 at Agricultural Research Institute Mingora Swat. The experiment was laid out in Randomized complete block design 2 factors factorial with three replication ,having plot size 1.8×5m. Composite soil samples from the experimental site at ARI, Swat were taken before sowing and analyzed (table-1). Monthly rain fall and temperature recorded during the crop growth period is given in (Fig 1). A basal fertilizer of NPK was applied uniformly into all plots before sowing. All agronomic and plant protection

measures were adopted to raise a good crop. The data recorded were days to flowering ,days to maturity ,Plant height ,pods plant^{-1} ,kernel pod^{-1} and pod yield kg ha^{-1}.

Table 1. Soil physical and chemical properties of the experimental site

Soil Property	Value
Bulk Density (g cm^{-3})	1.27
pH	7.14
Organic matter (%)	1.01
Total N (%)	0.021
AB-DTPA Extractable P (mg kg^{-1} soil)	3.29
AB-DTPA Extractable K (mg kg^{-1} soil)	48

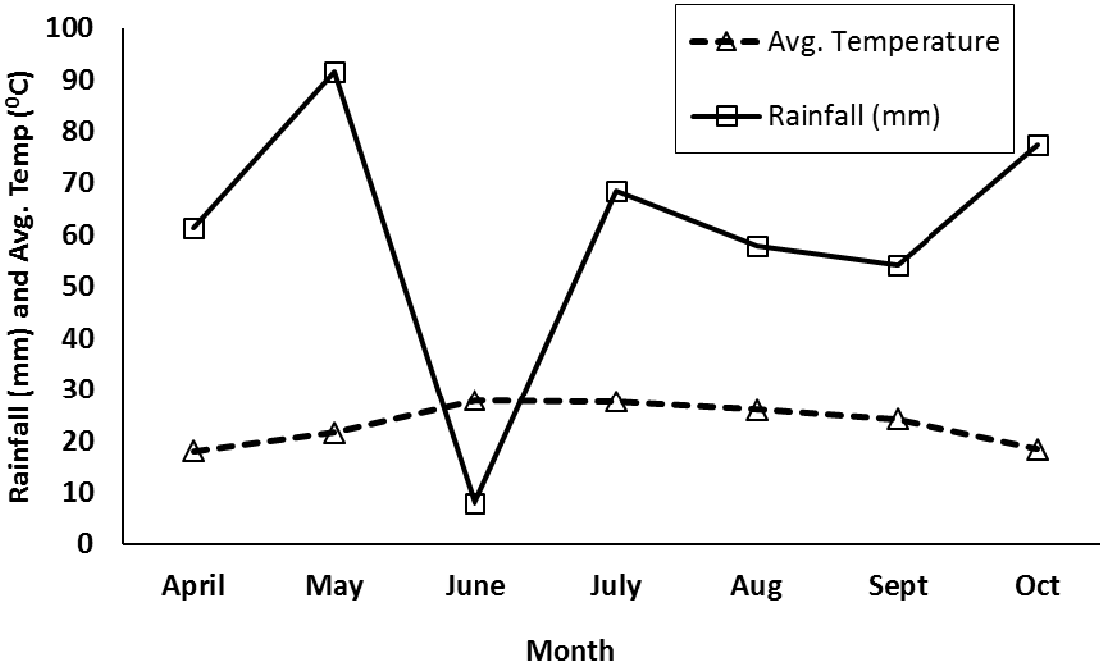

Fig 1: Weather data

Results and Discussion

Days to flowering:

Significant difference (P≤0.05) was observed between dates of sowing and varieties. Maximum days (49), to flowering was taken by plants sown on 10th May followed by 30th April .Whereas minimum days (40) for flowering was recorded by plants sown on 10th June.

Table 2: Days to flowering of Groundnut as affected by different sowing dates and varieties at Agricultural Research Institute Mingora Swat during 2014

Dates	**SP-2000**	**PG-1166**	**Mean**
20th April	45	46	45.5 b
30th April	48	48	48 a
10th May	49	49	49 a
20th May	45	45	45 b
30th May	41	41	41 c
10th June	40	40	40 c
Mean	**44.6**	**44.8**	**44.7**

Days to maturity: Analysis of variance for days to maturity showed that highly significant difference between sowing dates and varieties. Maximum days (177) to maturity were taken by plants sown on 30th April, followed by plants sown on 20th April. Whereas minimum days (162) for maturity was recorder when plants sown on 10th June. The results are in agreement with the findings of Deka et al. 1997.

Tab 3: Days to maturity of Groundnut as affected by different sowing dates and varieties at Agricultural Research Institute Mingora Swat during 2014.

Dates	SP-2000	PG-1166	Mean
20th April	177	175	176 a
30th April	178	176	177 a
10th May	172	172	172 b
20th May	171	173	172 b
30th May	165	167	166 c
10th June	160	164	162 c
Mean	**170.5**	**171**	**170.8**

Plant height:
Plant height showed significant difference between sowing dates and varieties(Fig.2) .Taller plants (59.5 cm) were recorded when plants sown on 20th April, followed by 30th April (52cm), while shorter plants (35 cm) were observed in the sowing of 10th June .

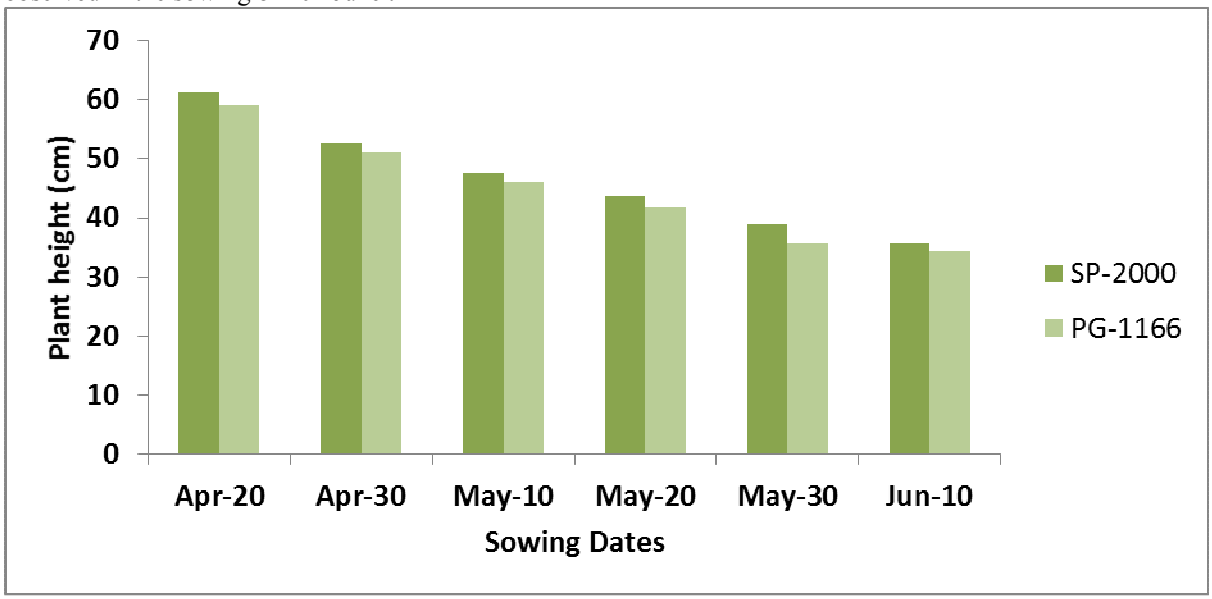

Fig 2: Plant height (cm) of Groundnut varieties (PG-1166 and SP-2000) as affected by different sowing dates at Agricultural Research Institute Mingora Swat during 2014.

Pods plant^{-1} :
Significant difference (P≤0.05) in pods plant^{-1} were observed among different sowing dates and varieties (Fig.3). Maximum pods plant^{-1} (41 pods plant^{-1}) was obtained by the plant sown during 20th April .However minimum pods plant^{-1} (16 pods plant^{-1}) was noted in plants sown on June 10th. The late sown crop mature earlier, resulting in a reduced pod number and 100-kernel weight (Reddy and Reddy 2001).Lower number pods plant^{-1} was due to decrease in vegetative phase and also shorting in maturation Caliskan et al. (2008).

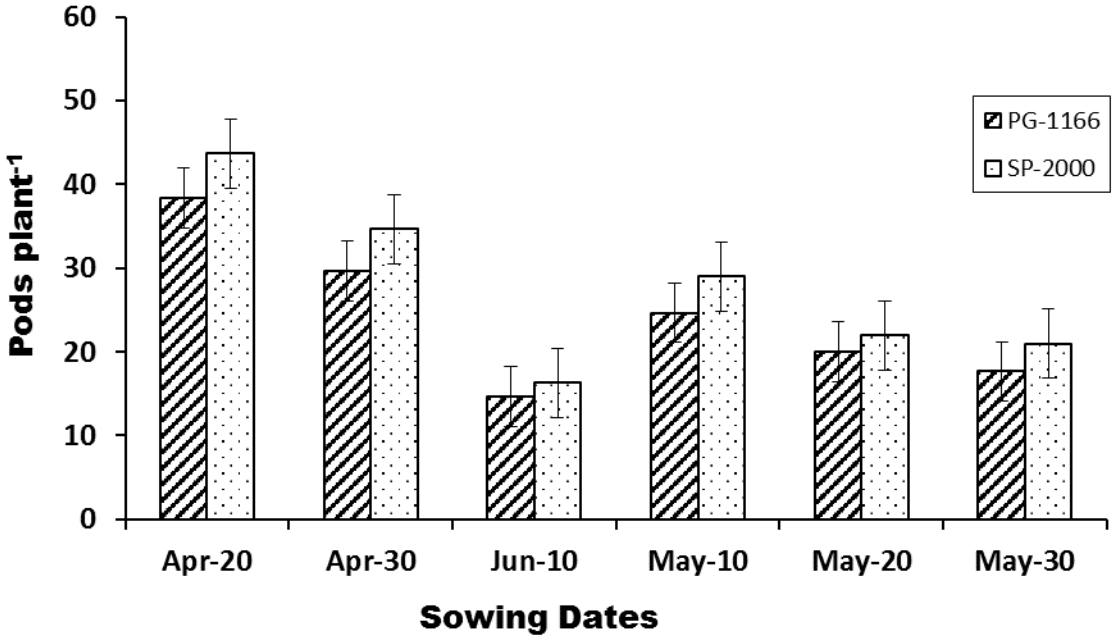

Fig. 3: Pods plant^{-1} of Groundnut varieties (PG-1166 and SP-2000) as affected by different sowing dates at Agricultural Research Institute Mingora Swat during 2014.

Kernel pod^{-1}: Kernel pod^{-1} showed non-significant difference between sowing dates and varieties.

Tab 4: Kernel pod^{-1} of Groundnut as affected by different sowing dates and varieties at Agricultural Research Institute Mingora Swat during 2014.

Dates	SP-2000	PG-1166	Mean
20th April	2	2	2
30th April	2	2	2
10th May	2	2	2
20th May	2	2	2
30th May	2	2	2
10th June	2	2	2
Mean	**2**	**2**	**2**

Pod yield kg ha^{-1}:

Pod yield showed a significant difference (P≤0.05) were noticed among dates of sowing and varieties (Fig. 4). Maximum pod yield (5179 kg ha^{-1}) was obtained by the plant sown during 20th April, followed by plant sown on 30th April. Whereas minimum pod yield (2168 kg ha^{-1}) was obtained in plant sown on June 10th.

Reduction in test weight for delayed sowing may be attributed to the lower rate of phloem transport for the deposition of photosynthate to the sink portion of the plant as the delayed sowing invites higher temperature, it also invites higher rate of photorespiration as a concomitant effect. Similar increases in pod yield were also reported by (Attarde et al., 2002, Petra 1998 and Deka et al., 1997). Kaynak (2010) found that late sowing groundnut crop were stressed because of short growth period and also unsuitable growing condition.

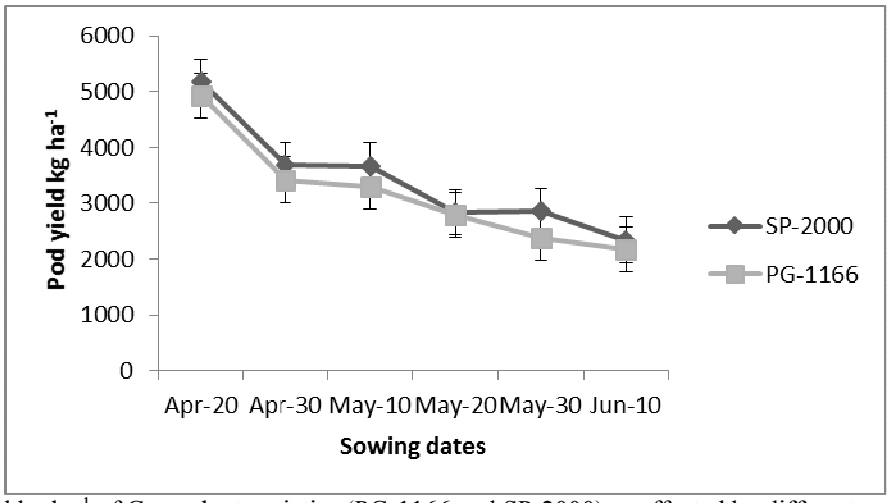

Fig 4: Pod yield kg ha^{-1} of Groundnut varieties (PG-1166 and SP-2000) as affected by different sowing dates at Agricultural Research Institute Mingora Swat during 2014.

CONCLUSION

Based on study early sowing (April) was found better for producing more number of pods plant^{-1}, kernels plant^{-1}, 100 kernel weight, maximum mature kernel and finally higher groundnut pod yield. It is therefore, recommended to sow groundnut in the month of April in Malakand Division for getting higher maximum pod yield.

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