

## 'Swat Kulat-2' A High Yielding and Spreading Type Cowpea Variety for Rainfed Areas of Malakand Division

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### Abstract

Studies were carried out on cowpea variety Swat Kulat-2 (SK-2) at the Agriculture Research Institute (N) Mingora, Swat during the year 2003-04 to record variety registration data on cowpea variety "Swat Kulat-2" which is high and stable yielding, well-adapted and spreading type variety especially for rainfed areas of Malakand division. This variety has later on been approved by the Provincial Seed Council and released for general cultivation by the farmers of Malakand division. Swat Kulat-2 is a high yielding variety for rainfed areas than the existing local varieties grown in Malakand division. It covers the ground with its dense foliage and preserves the moisture for a longer period. The grain size is medium with pale color. The variety is late maturing with spreading growth habit having plant height of 150-170 cm. The variety has been tested on research Institute as well as farmer's fields and found to be highly resistant to shattering and diseases. The yield and yield components data recorded on Swat Kulat-2 in the present study also justify that it is among one of a high yielding varieties in this area.

### Introduction

Cowpea is of major importance to the livelihoods of thousands of relatively poor people of Malakand division. From production of this crop, rural families variously derive food, animal feed, and cash, together with spillover benefits to their farmlands through, for example, in situ decay of root residues, use of animal manures, and ground cover. In fresh form, the young leaves, immature pods, and peas of cowpea are used as vegetables, while several snacks and main meal dishes are prepared from the grain. All the plant parts that are used for food are nutritious, providing protein, vitamins, and minerals.

Another important feature of this variety is that it fixes atmospheric nitrogen through symbiosis with nodule bacteria (*Brady rhizobium* spp.). A contribution of 40-80 kg N/ha is the commonly obtained range, while the total amount of nitrogen fixation is 70-350 kg/ha. The agricultural lands of Malakand Division are characterized by systems of farming that make limited use of purchased inputs, except for some crops such as wheat onion and tomato. Cowpea can therefore provide the best option for restoring fertility through intercropping with coarse grain crops (maize etc).

Malakand division is deficient in the production of pulses. Local production is about 15% of the total pulses consumption, and, the rest is imported from other Districts/Provinces or abroad to meet the total requirements. Cowpea being a new introduction in the area can successfully be cultivated. Sawant (1994) analyzed 10 varieties of cowpea and reported that seed yield was significantly and positively correlated pods/plant, 100 seed weight, seed/pod and pod length. Damarany (1994) tested 36 genotypes of cowpea and reported that TVU21 produced the longest pods (23.5 cm) and 100 seed weight (26.0 g) in both seasons. IT82D812 had the highest number of seeds per pod (16.9) and IT82D975 had the greatest seed filling in both seasons. Blackeye Crowder produced the highest seed yield/plant (60.8 g). Tarseem *et al* (1993) released cowpea 263, which is a selection from Banglaore Local, evaluated for three seasons, including testing in farmers' fields and reported that the yield was 50 % superior to that of Pusa Dofasli and is suitable for both spring and rainy seasons. Pods are ready for harvesting 45-50 days after sowing. The present study is aimed to record variety registration data on cowpea variety "Swat Kulat-2" which is a high and stable yielding variety for its later on approval and release by the Provincial Seed Council for general cultivation of the farmers of Malakand Division. It is also worthy to mention that variety IT-86D-472 with semi erect growth habit has already been registered with FSC & RD and released for general cultivation of the farmers for irrigated areas, while variety Swat Kulat-2 has been released for barani areas with spreading growth habit.

### Materials and methods

The experiment comprised of a new high yielding and spreading type variety 'Swat Kulat-2' which was included in variety registration trial conducted at ARI, Mingora, Swat with the objective to register its morphological, botanical and other characters with Federal Seed Certification & Registration Deptt. The field was thoroughly prepared and fertilizer at the rate of 20:50 kg N: P<sub>2</sub>O<sub>5</sub>/ha was applied before sowing. The experiment was laid out in randomized complete block design with three replication and 3 treatments with plot size of 4 X 2.4 m<sup>2</sup> = 9.6 m<sup>2</sup> i.e. 4 rows, 4 meter long with spacing of 60 cm. Plant to plant distance was kept 25 cm, with a sowing depth of 2-3 cm. Sowing was done, using Kera method. Three irrigations were applied during the whole cropping season. The plants from each plot were labeled and kept separated. The pods were collected and yield

data in kg/ha were recorded. The seed yield and other relevant variety registration data on Swat Kulat-2 were recorded in coordination with Seed Certification Officer according to standard procedure.

## Results and Discussion

### 1. Days to Maturity and Plant Height (cm)

Data on days to maturity revealed significant variation at 5 % level of significance (Table-1). It is evident from the data that variety IT-86D-472 was early in maturity with 79.3 days, followed by variety Swat Kulat-2 with 99.6 days while variety local check was late maturing with 112.3 days. Plant height also revealed significant differences at 5 % level of significance (Table-1). Maximum plant height of 178.6 cm was recorded for variety Swat Kulat-2, while minimum plant height of 43.2 cm was recorded for variety IT-86D-472, as compared to check variety with plant height of 127.8 cm. The variation in days to maturity and plant height may be attributed to specific genetic characteristics and different growth habits of these varieties.

### 2. Pods/Plant and Seed/Pod

Data on pods/plant and seed/pod is presented in table-1. Pods per plant revealed significant differences at ( $P \leq 0.05$ ). It is evident from the data that maximum pod/plant of 16.6 were recorded for variety IT-86D-472, followed by variety Swat Kulat-2 with 13.3 pods, while minimum pods/plant of 7.6 were recorded for check variety. Data on seed/pod also revealed significant differences at ( $P \leq 0.05$ ). Maximum seed/pod of 11.6 were recorded for variety IT-86D-472, followed by variety Swat Kulat-2 with 10.0 seed/pod, while minimum seed/pod of 6.6 were recorded for check variety. Variation among pods/plant and seed/pod is largely due to genetic characteristics of the variety, however fertility and nature of soil could also be the cause of this variation.

### 3. 100 Grain Weight (gm) and Plant Population

Data on 100-grain weight and plant population is presented in table-1. 100 grain weight revealed significant differences at 5 % level of significance. It is evident from the data recorded that variety IT-86D-472 had maximum 100 grain weight of 14.5 gm, followed by variety Swat Kulat-2 with 100 grain weight of 13.2 gm while variety local check had minimum 100 grain weight of 9.5 gm. Data on plant population remained non significant at ( $P \leq 0.05$ ). Genetic character of each variety has a dominant role for this variation, however, this could also be attributed to change in soil fertility and soil structure.

### 4. Grain Yield (Kg/ha.)

Grain yield revealed significant differences at 5% level of significance (Table 1). It was observed that varieties IT-86D-472 and Swat Kulat-2 had maximum grain yield of 2145.8 kg/ha and 1937.5 kg/ha respectively, while minimum grain yield of 479.2 kg/ha was recorded for check variety. This variation among different varieties could be explained in terms of pods/plant, and seed/pod. As yield is positively correlated with pods/plant and seed/pod, therefore varieties IT-86D-472 and Swat Kulat-2 with highest number of pods/plant and seed/pod resulted in highest grain yield. These results are in agreement with Sawant (1994) who reported that seed yield was significantly and positively correlated pods/plant, 100 seed weight, seed/pod and pod length. This may also be attributed to specific genetic characteristics, soil fertility and soil structure.

**Table 1: Agronomic characteristics and other data of Cowpea Variety Registration Trial**

#.	Variety	Maturity	Pl. ht. (cm)	Pods/plant	Seeds/pod	100 gr. wt. (g)	P.P./ ha (000)	Yield kg/ha
1	Swat Kulat-2	99.6 B	178.6 A	13.3 AB	10.0 B	13.2 A	275	1937.5 A
2	IT-86D-472	79.3 C	43.2 B	16.6 A	11.6 A	14.5 A	291	2145.8 A
3	Local check	112.3 A	127.8 A	7.6 B	6.6 C	9.5 B	260	479.2 B
LSD (P 0.05)		6.1	54.9	6.0	1.5	1.8	N.S.	883.6

**Table 2: Morphological and Botanical Characteristics of Swat Kulat-2**

Name of the variety	<b>Swat Kulat-2</b>
Species	<b>Vigna unguiculata L</b>
Type of Variety	Open Selection
Variety Compared	Local Charsadda
Pedigree	IT-86D-472 (selection from a set of germplasm received from IITA, Nigeria).
Breeding Centre	Agriculture Research Institute (N) Mingora, Swat, KPK
Proper Sowing time	1 <sup>st</sup> to 15 <sup>th</sup> of July
Maturity (duration)	90-105 days

**Physical Characteristics:**

<b>1. Seedling Characteristics</b>	
Germination type	Epygial
Emergence	2-4 days
Seedling height (2 Weeks)	10-15 cm
Hypocotyle Length	2.5 cm
Cotylدون Length	7.0 cm
Cotyledon width	5.7 cm
Cotyledon Color	Pale

<b>3. Stem</b>	
Hairiness	Smooth
Branching	Basal
Nodes/Main Stem	10-20
Branches/Main Stem	10-15
Color at Flowering	Light green
Color at Maturity	Light green with grey patches
Diameter at Maturity	5-8 mm
Stem width	Medium – Thick

<b>5. Flower</b>	
Flowering habit	Indeterminate
Flowering Period	35-45 days
Size	Medium
Color	Purple

<b>7. Seed</b>	
Shape	Flat
Color (Seed Coat)	Pale
Coat Luster	Moderately shiny
Coat texture	Soft
Size	Length 7.5 mm, Width 6 mm (medium)
Diameter	4.5 mm
1000 Seed Weight	100-150 gm
Hilum Color	Off white
Hilum Shape	Ovate
Cotyledon Color	Pale
Radical	Less prominent

<b>2. Plant</b>	
Growth Type	Indeterminate
Growth Habit	Annual, spreading
Plant Shape	Spreading
Plant Height	150-170 cm

<b>4. Leaf</b>	
Color	Green
Shape (Leaflets)	Terminal leaflet narrow, lateral leaflets broad
Number of Leaflets	3 (trifoliolate)
Size (Leaflets)	Length = 10.3 cm, Width 5.8 cm
Leaflet tip	Acuminous
Attitude	Semi erect
Leaf Texture	Membraneceous – Thick
Raised nervation on leaf blade	Frequent
Senescence	Scarce
Defoliation	Scarce

<b>6. Pod at Maturity</b>	
Color	Pale
Pod Size	Length = 17 cm, Width = 3.7 mm
Setting	Scattered
Pods/Plant	15-20
Seed/Pod	13-15
Pubescence	Smooth

<b>8. Resistance</b>	
Lodging	Moderate
Insects	Moderate
Shattering	High
Diseases	High

**Literature cited**

- Damarany, A. M. 1994. Testing and screening of some cowpea genotypes under Assuit conditions. Assuit Journal of Agricultural Sciences. 25(4): pp: 9-19.
- Sawant, D. S. 1994. Association and path analysis in cowpea. Annals of Agricultural Research. 15(2): pp. 134-139.
- Tarseem, L., S. Surjan, T. Lal, and S. Singh. 1993. "Cowpea 263" is a dual season vegetable. Indian Horticulture. 37(4): pp. 18-20.

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