

JUSTIFICATION OF THE TAXONOMIC ASSIGNMENT OF MUNGBEAN PLANT TO THE GENUS *Vigna*, Savi II. MORPHOLOGICAL FEATURES.

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ABSTRACT

A comparative study of the morphological features of mungbean and cowpea was carried out as an evidence for the assignment of mungbean to the genus *Vigna*. Both plants shared the following characters:

Seed germination is epigeal. Plant is an annual herb. Branching starts at the second node from the base and continued upwards. Branches play a vital role in yield production. Stem is erect, ribbed cylindrical, solid and the upper internodes being longer. Leaves are pinnately compound, trifoliate, alternate and stipulate. The apical leaflet has two small stipels and each of the lateral ones has one small stipel. Leaflet blade is ovate. Terminal petiolule is longer than the lateral ones. Plants develop two basal simple and opposite prophylls. Inflorescence is an axillary raceme, bearing few number of flowers toward the peduncle apex. Flower is yellow, bisexual, zygomorphic and perigenous with a short pedicel and three small green caducous bracts at its base. The two keel petals are incurved and the two lateral wing petals have claw. Style is bent and bearded along the inner side. Placentation is marginal. Fruit is a legume. Seed is small, globose and glabrous.

These findings strengthen the concept that mungbean belongs to the genus *Vigna*.

Keywords: *Vigna*, mungbean, cowpea, morphology and taxonomy

INTRODUCTION

Mungbean is a member of Fabaceae. The nomenclature of this plant is a matter of confusion. For a long time the species was classified in the genus *Phaseolus*. However, Wilczek (1954) transferred mungbean and other closely related Asian species formerly classified in *Phaseolus* to *Vigna*, Savi. The taxonomic identity of mungbean has long been disputable. The present study was carried out to ensure its affinity either to *Phaseolus* or *Vigna*.

This paper is the second in a study of 3 parts. In this part a comparative study of morphological features of mungbean and cowpea is carried out to strengthen the concept which has been reached in the first part of the series; *i.e.*, mungbean belongs to the genus *Vigna* (El-Sahhar *et al.*, 2002).

Vigna radiata (L.) Wilczek (mungbean) is an annual, semi-erect to erect or sometimes twining, deep-rooted herb, 25 to 100 cm. tall. The stems are branching from the base and covered with short fine brownish hairs. The leaves are alternate and trifoliate, or sometimes with five leaflets. Leaflets are medium to dark green, broadly ovate, sometimes lobed, rounded at the base and pointed at the apex, 5 to 12 cm. long, and 2 to 10 cm. wide. The leaves and petiole covered with scattered hairs on both sides; stipules prominent. From 10 to 25 flowers are borne in axillary clusters or racemes.

The flowers are greenish to bright yellow, with a gray-tinged keel, 1 to 1.75 cm. in diameter. The pods are cylindrical, straight to strongly curved, pointed at the tip, and radiate horizontally in whorls. When mature, the pods are glabrous or have short hairs, tawny brown to black, 5 to 14 cm. long and 4-6 mm. wide, and may burst open when dry shattering the seeds. Seeds, borne 8 to 20 per pod, are globose, glossy or dull; with green, yellow, tawny brown, black or mottled testa. Dull seeds are coated with a layer of the pod inner membrane which may be translucent or pigmented and which covers a shiny testa. The testa is reticulated with numerous fine wavy ridges and cross walls. Seeds vary in weight from 15 to 85 mg. The hilum is round, flat (non-concave) and white. Seed germination is epigeal. Flowers are self-fertile and highly self-pollinated. Flowering is indeterminate and may continue over a period of several weeks if the plant stay healthy. Pods mature about 20 days after flowering. Rapid senescence does not occur (Duke, 1981 and Poehlman, 1991).

Vigna sinensis Savi (cowpea) is an annual herb, erect or suberect, spreading to 80 cm. or more tall, glabrous; taproot stout with laterals near soil surface, roots with large nodules; stems usually procumbent, often tinged with purple; first leaves above cotyledons are simple and opposite; subsequent trifoliolate leaves are alternate, the terminal leaflet often bigger and longer than the two asymmetrical laterals; petiole stout, grooved, 5-15 cm. long; leaflets ovoid-rhombic, entire or slightly lobed, apex acute, 6.5-16 cm. long, 4-11 cm. wide, lateral leaflets oblique; inflorescence axillary, 2-4 flowered, crowded, near tips on short curved peduncles 2.5-15 cm. long; calyx campanulate with triangular teeth, the upper 2 teeth connate and longer than rest; corolla dull white, yellow, or violet, with standard 2-3 cm. in diameter, keel truncate; stamens diadelphous, the anthers uniform; pods curved, straight or coiled; seeds 2-12 mm. long, globular to reniform, smooth or wrinkled, red, black, brown, green buff or white, as dominant colour; full coloured, spotted, marbled, speckled, eyed, or blotched; (5-30 g/100 seeds, depending on the cultivar). Germination phanerocotylar (Duke, 1981 and Purseglove, 1988).

MATERIALS AND METHODS

Source of seeds: Seeds of mungbean cv. Kawmy 1 were procured from Field Crops research Institute, National Research Centre, Dokki, Giza, Egypt. Whereas, seeds of cowpea (*Vigna sinensis* Savi cv. Dokki 331) were secured from Department of Vegetable Research, Horticulture Research Institute, Agricultural Research Centre, Giza, Egypt.

Test of germination: A germination test of mungbean and cowpea was carried out to determine the speed (first count) and the capacity (final count) of germination according to the Rules For Seed Testing Association (Anon., 1985).

Field work procedure: Two field experiments were carried out in the Agricultural Experiments and Research Station of the Faculty of Agriculture,

Cairo University, Giza, Egypt, during 1999 and 2000 seasons. Seeds of cowpea and mungbean were sown on April, 5th. and May, 5th in 1999; respectively. Whereas, in the second season, sowing was carried out on April, 12th. and May, 11th. The trial layout was a randomized complete block design with 5 replicates per each of mungbean and cowpea plants. Plot dimensions were 4x 5 m., with 8 ridges 60 cm. apart. Seeds were sown in hills 20 cm. apart on both sides of the ridge for mungbean. Whereas, in case of cowpea hills were 25 cm. apart on one side of the ridge. The plants were thinned to 2 plants per hill for both mungbean and cowpea. The usual farming procedures for the crops were followed.

Vegetative growth: Ten plants, 2 plants from each of the 5 replicates, were assigned to follow up the vegetative growth of mungbean and cowpea plants at 2 weeks intervals.

The following measurements were recorded:

- 1- Plant height; cm., measured from the cotyledonary node up to the upper most point of plant.
- 2- Length of the main stem; cm., measured from the cotyledonary node up to the shoot apex.
- 3- Number of internodes of the main stem.
- 4- Length (cm.) of successive internodes of the main stem of mature plant.
- 5- Number of secondary branches per plant.
- 6- Length of secondary branches, cm. of mature plant.
- 7- Fresh weight of leafless shoot, g/plant.
- 8- Dry weight of leafless shoot, g/plant.
Dry weight of this character and those mentioned later on were carried out in an oven at 70 °C. till a constant weight was reached; almost 48 hrs.
- 9- Number of leaves per plant.
- 10- Total leaf area per plant, cm²., leaf area was measured by means of LI-3000A portable area meter, LI-3050A Transparent belt conveyer- of LI-Cor, Inc., Lincoln, Nebraska, U.S.A.
- 11- Fresh weight of leaves per plant, g.
- 12- Dry weight of leaves per plant, g.

Reproductive growth: Reproductive growth was followed up during the 2 experimental seasons. Flowering period of mungbean and cowpea plant was determined; *i.e.*, dates of onset and end of flowering were recorded. Time taken for different reproductive developmental stages was fixed; *i.e.*; flower bud differentiation full blooming and fruit set and maturity. In addition, the following characters were recorded:

- 1- Number of matured dry pods per plant at harvest time.
- 2- Number of seeds per pod.
- 3- Number of seeds per plant.
- 4- Dry weight of pods per plant, g.
- 5- Yield of matured dry seeds per plant, g.
- 6- Specific weight of seeds (average weight of 100 seeds, g.).

Data of the present investigation were subjected to various conventional methods of statistical analysis according to Snedecor and Cochran (1982).

RESULTS AND DISCUSSION

Seed germination: The initial growth of mungbean and cowpea seedlings follows the epigeous germination pattern. The radical emerges from the seed testa after 18 hrs. in case of mungbean and 21 hrs. for cowpea. The hypocotyl elongates and raises the two cotyledons above the ground accompanied by the partially enveloping remains of the seed. Cotyledons of mungbean and cowpea are fleshy, green in colour and reniform in shape, being relatively larger in case of cowpea. The secondary roots develop as seedling is 8-9 days old. The cotyledons fall at the age of 10-11 days. The first 2 foliage leaves (the prophylls) develop at the age of 14 days and seedling stage terminates. The 2 prophylls are oppositely arranged, green in colour and lanceolate (mungbean) or ovate (cowpea) in shape.

The rules of germination given by ISTA (Anon., 1985) were followed. The germination speed (after 5 days) and the germination capacity (after 8 days) were identical being 96.5% for mungbean and 79.5% for cowpea. This implies that seeds of both plants are highly viable.

fig1

The stem: mungbean and cowpea are annual herbaceous plants. The stem is green in colour, erect, covered with short hairs, ribbed, cylindrical, and solid. Branching starts at the second node from the base then continues upwards. Noteworthy that, the lateral branches play a vital role in yield production. They are mainly responsible of flowering (Figure 1). This description is in harmony with that given by Sakr (1971), Duke (1981) and Poehlman (1991).

Plant height: The equation and line of periods and plant height at successive ages are presented in Figure (2) where a significant cubic effect of periods was achieved for this character. The increase in plant height continued during most of the entire life span of the plant. The maximum plant height of mungbean was achieved at the age of 10 weeks, being 104.4 cm., and for cowpea at the age of 12 weeks, being 99.8 cm. Elongation of plant continued at almost a uniform rate throughout the consecutive periods. However, the elongation rate of plant was much higher throughout the period of 8 to 10 weeks old. During this period the height of mungbean plant increased from 79.9 to 104.4 cm. and cowpea plant increased from 57.3 to 91.2 cm.

Length of the main stem: A significant cubic effect of plant age was detected on length of the main stem. The equation and line of length of the main stem and the periods are given in Figure (3). A significant increment in stem length occurred from sowing date through the age of 10 weeks, in case of mungbean, where the average length was 74.5 cm. It is important to note that the period of 6 to 8 weeks old was the most active one throughout the entire growing season, since the length of the main stem increased from 29.3 to 58.1 cm., *i.e.*; 28.8 cm. was added during these 2 weeks, being 38.7% of the total stem length (74.5 cm.). As to cowpea, the corresponding active period took place during the age of 10 to 12 weeks old, where the main stem increased in length from 57.9 to 83.3 cm. This increase represented 32.4% of the maximum length of the main stem attained by plant (87.4 cm. at 14 weeks old).

Number of internodes of the main stem: A significant cubic effect of plant age on number of internodes of the main stem was detected. Figure (4) represents the corresponding cubic equation and line. Number of internodes of mungbean main stem averaged at 4 weeks old 4.75 compared with 4.6 for cowpea. This number increased significantly at the following sampling dates up to 10 weeks old reaching 15.3 and 17.3 for mungbean and cowpea; respectively. No further increase was recorded in this concern.

Length of successive internodes of the main stem: Figure (5) represents the average length of successive internodes of mungbean main stem 10 weeks old, and cowpea at the age of 14 weeks. Both plants showed a similar growth pattern. The average length of mungbean first internode was 2.7 cm. compared with 3.7 cm. for cowpea. The average length of successive internodes of the main stem decreased reaching 1.0 cm. for mungbean third internode and 2.0 cm. for cowpea fifth internode. The average length of successive internodes then increased gradually. Mungbean thirteenth internode reached 10.8 cm. Cowpea sixteenth internode was 9.6 cm. The length then decreased toward the shoot apex.

fig2,3

fig4,5

Number of secondary branches: Mungbean recorded a significant quadratic effect of periods on number of secondary branches. However, the effect pattern of cowpea was cubic (Figure, 6). Up to the age of 6 weeks, mungbean formed 5.7 secondary branches compared with 4.3 for cowpea.

These numbers were almost doubled throughout the following 2 weeks, being 11.0 and 8.1 for mungbean and cowpea; respectively. No further substantial increment was noticed. Worthy to state that the secondary branches did not bear any more appreciable lateral branches. Secondary branches played the main role in yield production.

Length of secondary branches: Figure (7) illustrates the length of secondary branches of matured plant. The lateral shoot developed in an acropetal succession; *i.e.*, from the base toward the apex. The first branch, the lowest one, averaged 96.5 and 103.1 cm. for mungbean and cowpea; respectively. The average length of secondary branches then decreased gradually reaching a minimum of 6.3 cm. for mungbean and 43.6 cm for cowpea at the uppermost branch.

Fresh weight of leafless shoot: A significant cubic effect of plant age on fresh weight of leafless shoot was demonstrated. The cubic equation and line of this character are given in Figure (8). A gradual increase in fresh weight of leafless shoot was achieved reaching a maximum of 226.0 g. at the age of 10 weeks in case of mungbean plants, compared with 433.21 g. at 14 weeks old for cowpea plants.

Dry weight of leafless shoot: The equation and line of periods effect on dry weight of the leafless shoot are shown in Figure (9), where a significant cubic effect was achieved. Average dry weight of the leafless shoot increased steadily till the end of the growing season, being 55.12 g. at 10 weeks old for mungbean, compared with 102.98 g. at the age of 14 weeks for cowpea. At these ages plants attained their final height, maximum number of lateral branches and fruit formation. Worthy to note that the maximum increase in dry weight of leafless shoot was recorded through the period of 8 to 10 weeks old, where weight increased from 17.96 to 55.12 g. for mungbean and from 16.30 to 61.68 g. for cowpea; such increment almost represents half of the final attained weight.

The leaf: Mungbean and cowpea plants bear 2 types of leaves. The first two basal leaves, prophylls, are simple, develop at the age 2 weeks and defoliate at 6 weeks old. Leaves other than the first two basal prophylls are trifoliate, with leaflets three, pinnately compound with terminal petiolule longer than the lateral (Figure, 10). Leaves are alternate, green in colour, ovate in shape, rounded at the base, pointed at the apex and with entire margin. The petiole is stout and grooved. The leaves and petioles of mungbean are covered with short hairs. But, leaves of cowpea are glabrous. Venation is reticulate-pinnate. The midrib divides the blade of the apical leaflet into two equal sides, but the lateral ones are unequal-sided. The leaf has two ovate stipules at its base.

fig6,7

fig8,9

fig10

The apical leaflet has two (sometimes four) stipels, and each of the lateral leaflets has only one stipel. Such description of the leaf is generally in agreement with those given by Lawrence (1951), Montasir and Hassib (1956), Core (1959), Rendle (1967), Sakr (1971), Hutchinson (1973), Cronquist (1981), Duke (1981) and Poehlman (1991).

Number of leaves per plant: Number of leaves per plant of mungbean and cowpea showed a significant cubic effect through consecutive plant ages. The cubic equation and line of this character are given in Figure (11). It is evident that a significant increment in number of leaves per plant was achieved till the age of 10 weeks in case of mungbean with average of 35.5 and 12 weeks old for cowpea being 103.1.

Leaf area per plant: A significant cubic effect of plant age was recorded on the leaf area per plant. The cubic equation and line of this character are given in Figure (12). Total leaf area per plant increased slightly from sowing date up to the age of 4 weeks. Values obtained were statistically indifferent. As plants were 6 weeks old, a significant enhancement was achieved and total leaf area increased steadily reaching a maximum of 5866.8 cm² for mungbean at 10 weeks old and 9049.1 cm² for cowpea at the age of 12 weeks.

Fresh weight of leaves per plant: A significant cubic effect of plant age was found on this character. Figure (13) depicts the cubic equation and line of fresh weight of leaves and ages. Average fresh weight of leaves per plant at 4 weeks old was 3.95 and 5.40 g. for mungbean and cowpea; respectively. Values achieved progressive significant increments throughout consecutive periods reaching 134.30 g. at 10 weeks old for mungbean and 295.48 g. at the age of 12 weeks for cowpea. Worthy to note that fresh weight of leaves in both studied plants increased noticeably during the period of 8-10 weeks. This accompanied the active formation period of lateral branches.

Dry weight of leaves per plant: Figure (14) illustrates the cubic equation and line of the dry weight of leaves per plant and ages, where a significant cubic effect of plant age was recorded on this character. Normally, the growth rhythm of dry weight of leaves per plant was identical with that of the fresh weight given earlier. Average dry weight of leaves per plant at 4 weeks old was 1.02 and 0.94 g. for mungbean and cowpea; respectively. A constant increase in the dry weight took place in mungbean up to 10 weeks old (36.81 g.) and in cowpea up to 12 weeks old (59.0 g.).

The inflorescence and the flower:

Formation of inflorescence in mungbean and cowpea plants starts at the age of 6 weeks in form of flower buds. The inflorescences develop on both of the main stem and the lateral branches. A week later. Anthesis takes place. At the age of 8 weeks, full blooming and start of fruit formation occur. When plants are 10-12 weeks old all flowers develop into fruits. Fruits are completely matured and ready for harvest at the age of 12 to 13 weeks, in case of mungbean and at 16 weeks old for cowpea.

fig11,12

fig13,14

Inflorescence of mungbean is an axillary raceme bearing 5-15 flowers toward the apex of a long peduncle. The peduncle varies from 2 to 12 cm. in length. However, inflorescence of cowpea bears few flowers crowded near the tip of a short curved peduncle. Flowers are usually 2-3 in alternate pairs. The flowers open early in the morning, close before noon, and petals fall the same day.

Flower (Figure, 15) is zygomorphic, bisexual, perigenous and yellow in colour. The flower has a short pedicel with 3 small green caducous bracts at base of the pedicel. Calyx is green in colour, tubular, hairy and gamosepalous with 5 lobes, being ascending imbricate. Corolla is yellow in colour, typically papilionaceous with 5 petals being descending imbricate. The posterior petal is outermost (standard or vexillum), the two lateral petals with separated claw in case of mungbean (wings) and the two anterior united petals (keel). Stamens are enclosed within the keel, diadelphous (9), 1. The posterior stamen is free and filaments of the rest 9 are fused to form a tube-like structure. Gynoecium is comprised of 1 carpel. The ovary is superior, elongated, green in colour, densely covered with hairs and unilocular. Ovules are numerous in two rows. Placentation is marginal. The style is long, flattened, hairy, bent at its base and terminates with the stigma. The floral formula for both mungbean and cowpea flowers is as follows:

$\% , CA_{(5)}, Co_{1,2,(2)}, A_{(9),1}, \underline{G}_1$ Marginal placentation

Such description of flower is generally in agreement with that given by Lawrence (1951), Montasir and Hassib (1956), Core (1959), Rendle (1967), Hutchinson (1973), Bailey (1969), Sakr (1971), Duke (1981) and Poehlman (1991).

Fresh weight of reproductive organs:

At the age of 6 weeks, average fresh weight of reproductive organs of mungbean plant was 2.28 g. (Table,1). A significant enhancement in this weight was recorded in the following period reaching 43.36 g. when plants aged 8 weeks. At the age of 10 weeks, another substantial increase in fresh weight of reproductive organs was attained. The weight was 91.8 g. (stage of fruit formation). As to cowpea, average fresh weight of reproductive organs was 18.37 g. at the age of 8 weeks. Such weight increased consistently throughout the following periods, reaching 207.01 g. at 14 weeks old (completion of fruit formation).

Table (1):The periodic growth and statistical parameters of fresh weight of reproductive organs (g) per plant of *Vigna radiata* (L.) Wilczek and *Vigna sinensis* Savi throughout the growing season

Plant age in weeks	Range	Mean \pm S.E.
<i>V. radiata</i> (L.) Wilczek:		
6	1.57 – 2.89	2.28 \pm 0.17 C
8	35.12 – 52.63	43.36 \pm 2.11 B
10	79.55 – 109.09	91.80 \pm 3.49 A
L.S.D.(0.05)		6.93 g.
<i>V. sinensis</i> , Savi:		
8	11.94 – 22.46	18.32 \pm 1.29 D
10	87.43 – 110.65	99.68 \pm 2.87 C
12	148.56 – 169.51	157.89 \pm 2.62 B
14	192.75 – 228.32	207.01 \pm 4.49 A
L.S.D.(0.05)		8.80 g.

fig15

Dry weight of reproductive organs:

It would be naive to state that dry weight of the reproductive organs per plant showed an identical trend to that mentioned earlier for their fresh weight (Table, 2). Referring to mungbean, average dry weight of reproductive organs per plant, 6 weeks old, was 0.49 g. Values obtained periodically increased significantly toward the end of growing season, being 61.31 g. at 10 weeks old. As to cowpea, at 8 weeks old, dry weight of reproductive organs per plant averaged 3.38 g. Such weight continued increasing significantly till the end of the growing season, being 159.8 g. at 14 weeks old.

Table (2): The periodic growth and statistical parameters of dry weight of reproductive organs (g) per plant of *Vigna radiata* (L.) Wilczek and *V. sinensis* Savi throughout the growing season.

Plant age in weeks	Range	Mean \pm S.E.
<i>Vigna radiata</i> (L.) Wilczek		
6	0.31 – 0.72	0.49 \pm 0.05 C
8	12.87 – 18.79	15.65 \pm 0.78 B
10	54.69 – 72.91	61.31 \pm 1.96 A
L.S.D. (0.05)		3.58 g.
<i>Vigna sinensis</i> Savi		
8	2.58 – 4.06	3.38 \pm 0.19 D
10	39.81 – 50.12	44.94 \pm 1.32 C
12	72.17 – 85.29	78.18 \pm 1.67 B
14	148.45 – 176.51	159.80 \pm 3.67 A
L.S.D. (0.05)		6.15 g.

The fruit and the seed:

Fruit is green in colour turns into dark brown when matures. It is simple, dehiscent legume (pod), splitting along both sutures at maturity, hairy slightly, cylindrical, and pointed at the tip. Mungbean pod is straight, 5 to 10 cm. long and 4 to 6 mm. wide. Number of seeds per pod ranges between 9 to 13 (Figure, 16). Cowpea pod is curved, averages some 20 cm. long and 9 to 11 mm. wide. Number of seeds per pod averages 12 .

Seeds of mungbean plant are small, globose, glabrous, glossy or dull and green in colour with mottled testa. The hilum is round, flat and white in colour. Testa with fine wavy ridges. Embryo is relatively large and dicotyledonous. Endosperm is absent. Seeds of cowpea plant are globular to reniform, wrinkled, glabrous and creamy in colour. The hilum is white surrounded by a dark ring. The embryo is composed of two large fleshy cotyledons. Endosperm is absent.

The previously mentioned characters of fruit and seed are in harmony with those given by Lawrence (1951), Montasir and Hassib (1956), Hutchinson (1967), Rendle (1967), Baily (1969), Sakr (1971), Cronquist (1981), Duke (1981) and Poehlman (1991).

(A) (B)
Fig. (16): Photographs of legume.
(A) *Vigna radiata* (L.) Wilczek 10 weeks old and
(B) *Vigna sinensis* Savi, 12 weeks old.

Yield components.

Results of yield components of studied plants at harvest time in the two growing seasons are given in Table (3). It is evident that mungbean formed a large number of pods per plant than that of cowpea, almost double; but greatly lesser in weight. Number of seeds per pod was nearly similar in both plants. On the other hand, yield of seeds per plant and specific weight of seeds of cowpea were greatly more than mungbean.

table3

CONCLUSIONS

In this second part of the present 3 parts study morphological features were investigated to define the likelihood of mungbean to cowpea in order to evaluate the relationship of mungbean to the genus *Vigna*. It was found that both plants are similar in most of their morphological characters adding more evidence to this concept, such as follows:

Seed germination is epigeal. Plant is an annual herb. Branching starts at the second node from the base and continued upwards. Branches play a vital role in yield production. Stem is erect, ribbed cylindrical, solid, and the upper internodes being longer. Leaves are pinnately compound, trifoliate, alternate and stipulate. The apical leaflet has two small stipels and each of the lateral ones has one small stipel. Leaflet blade is ovate. Terminal petiolule is longer than the lateral ones. Plants develop two basal simple and opposite prophylls.

Inflorescence is an axillary raceme, bearing few number of flowers toward the peduncle apex. Flower is yellow, bisexual, zygomorphic and perigenous with a short pedicel and three small green caducous bracts at its base. The two keel petals are incurved and the two lateral wing petals have claw. Style is bent and bearded along the inner side. Placentation is marginal. Fruit is a legume. Seed is small, globose and glabrous.

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تقنين الوضع التصنيفي لنبات فول المانح وتبعيته الى جنس اللوبيا *Vigna* Savi

ثانياً: الخصائص المورفولوجية

قاسم فؤاد السحار – عادل محمود خطاب – داليا محمد عبد العزيز نصار
قسم النبات الزراعي – كلية الزراعة – جامعة القاهرة – الجيزة – مصر

أجريت دراسة مقارنة للصفات المورفولوجية بين نباتي فول المانح واللوبيا كدليل لتبعية نبات فول المانح لجنس اللوبيا *Vigna* ووجد أن كليهما يتشابه في الصفات التالية:

انبات البذور هوائى ، النبات عشبي حولى ، يبدأ التفرع لدى العقدة الثانية جهة القاعدة ويستمر الى أعلى ، تلعب الفروع دوراً حيويًا فى انتاج المحصول ، الساق قائمة ، مخططة ، اسطوانية ، مصمتة ، السلامية الطرفية أكثر طولاً ، الأوراق مركبة ريشية ، ثلاثية الوريقات ، متبادلة ، ذات أذينات ، الوريقة الطرفية ذات أذنتين صغيرتين ، ولكل من الوريقتين الجانبيتين أذينة صغيرة ، نصل الوريقة بيضى ، عنق الوريقة أطرفية أكثر طولاً من أعناق الوريقات الجانبية ، يحمل النبات ورقتين أوليتين (بروفيل) متقابلتين لدى قاعدة الساق الرئيسية ، النورة عنقودية ابطية تحمل عدداً قليلاً من الازهار لدى قمة شمراخ النورة ، الزهرة صفراء اللون ، خنثى ، وحيدة التناظر ، محيطية ، ذات عنق قصير ، ذات ثلاث قنابات خضراء اللون جهة القاعدة ، بتلتى الزورق منحنيان ، والبتلتان الجانبيتان (الجناح) لهما ظلف ، القلم منحنى عليه شعيرات على طول الجانب الداخلى ، الوضع المشيمي حافى ، الثمرة باقلاء ، البذرة صغيرة ، مستديرة ، ملساء. وتؤكد هذه النتائج الاقتراح بتبعية نبات فول المانح الى جنس اللوبيا.

Table (3): Yield components of *Vigna radiata* (L.) Wilczek plant, 13 weeks old and *Vigna sinensis* Savi plant, 16 weeks old, in two growing seasons.

Character	<i>V.radiata</i> (L.) Wilczek		<i>V.sinensis</i> , Savi	
	Range	Mean ± S.E.	Range	Mean ± S.E.
- First season (1999)				
Number of pod per plant	95 – 127	111.4 ± 3.5	47 - 64	53.9 ± 2.2
Weight of pods per plant (g)	72.80 – 104.90	86.80 ± 3.40	147.58 – 198.41	168.6 ± 5.7
Number of seeds per pod	10.82 – 11.92	11.25 ± 0.11	12.16 – 12.84	12.5 ± 0.1
Number of seeds per plant	1117 – 1399	1251.2 ± 34.6	572 - 817	673.9 ± 24.4
Yield of seeds per plant (g)	57.08 – 73.79	64.49 ± 1.89	129.96 – 175.90	150.8 ± 5.4
Weight of 100 seeds (g)	4.74 – 5.50	5.16 ± 0.07	21.48 – 23.26	22.4 ± 0.2
- Second season (2000)				
Number of pods per plant	114 – 155	129.5 ± 4.6	48 - 73	61.8 ± 3.0
Weight of pods per plant(g)	91.54 – 124.65	105.02 ± 3.47	152.12 – 223.35	192.7 ± 9.2
Number of seeds per pod	10.86 – 11.83	11.27 ± 0.11	12.31 – 12.72	12.5 ± 0.0
Number of seeds per plant	1238 – 1692	1457.8 ± 48.5	591 – 910	772.6 ± 36.5
Yield of seeds per plant (g)	62.61 – 85.39	72.97 ± 2.49	136.92 – 200.35	171.1 ± 7.7
Weight of 100 seeds (g)	4.79 – 5.38	5.01 ± 0.06	21.55 – 23.17	22.2 ± 0.1

