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# EVALUATION OF MUNGBEAN 'PHASEOLUS AUREUS ROXB' STRAINS AT COLUMBIA, MISSOURI, IN 1971

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Two hundred and three strains of mungbeans (Phaseolus aureus Roxb.) were grown in 1971 at Columbia, Missouri, and evaluated for plant and seed characteristics. The strains originated from many sources and represented a diverse group of genotypes. All of the strains were grown as received and while some are obvious genetic mixtures, no attempt was made to purify the collections.

The mungbean strains grown in 1971 are listed in Table 1. Insofar as information is available, the USDA Plant Introduction (P.I.) number, variety name or selection number, country of origin, and source of seed planted in 1971 are given. Of the 203 strains grown in 1971, 160 had been grown at Columbia in 1970, and 43 are new accessions. In deciding which strains from the 1970 nursery to grow in 1971, primary selection was based on yield with the top 100 strains for yield in 1970 being included again in 1971 (with six exceptions). In addition, a representative group of the 1970 strains ranking in the top 5 to 10 percentile classes for earliness, height, branch length, pods per plant, seed per pod, 1,000 seed weight, protein content, lysine content, and methionine content, but not in the top 100 for yield, were included in the 1971 nursery.


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Two hundred and three strains of mungbeans (Phaseolus aureus Roxb.) were grown in 1971 at Columbia, Missouri, and evaluated for plant and seed characteristics. The strains originated from many sources and represented a diverse group of genotypes. All of the strains were grown as received and while some are obvious genetic mixtures, no attempt was made to purify the collections. This research was financed by a USAID 211(d) grant to the University of Missouri and by the Department of Agronomy, Missouri Agricultural Experiment Station.

## ORIGIN OF MUNGBEAN STRAINS

The mungbean strains grown in 1971 are listed in Table 1. Insofar as information is available, the USDA Plant Introduction (P.I.) number, variety name or selection number, country of origin, and source of seed planted in 1971 are given. Of the 203 strains grown in 1971, 160 had been grown at Columbia in 1970, and 43 are new accessions. In deciding which strains from the 1970 nursery to grow in 1971, primary selection was based on yield with the top 100 strains for yield in 1970 being included again in 1971 (with six exceptions). In addition, a representative group of the 1970 strains ranking in the top 5 to 10 percentile classes for earliness, height, branch length, pods per plant, seeds per pod, 1,000 seed weight, protein content, lysine content, and methionine content, but not in the top 100 for yield, were included in the 1971 nursery. These strains had originally been received by us from the United States Department of Agriculture New Crops Research Branch, the Oklahoma Agricultural Experiment Station, the Regional Pulse Improvement Project, the Orissa Department of Agriculture, and other sources. Of the strains new in 1971, 35 came from Korea, 3 from Hong Kong, 3 from India, and 2 from Thailand. Grateful acknowledgement is given to all who have supplied us with the mungbean strains.

## METHODS USED IN GROWING THE CROP

For most strains, three replications were grown in a randomized block design on the University of Missouri, Department of Agronomy, Bradford Experimental Farm, Columbia, Missouri in 1971. Due to insufficient seed, 19 strains were planted in two replications only and 11 strains were planted in one replication only. A plot consisted of a single 20 ft. (6 m) row with 36 in. (90 cm) spacing between rows. Seeds were distributed to provide for a 6 in. (15 cm) spacing within the row but due to variations in germination and emergence actual spacing varied somewhat. The plots were planted on June 8, 1971. Seeds were inoculated with 'EL' commercial culture inoculent before planting. The plots were fertilized with a 12-12-12 commercial fertilizer at a rate of 300 lbs/acre (337 kg/ha). An herbicide,

chloramben (3-amino-2, 5-dichlorobenzoic acid), was applied at time of planting at a rate of 3 lbs/acre (337 kg/ha). Plots were harvested during mid-October and threshed on a raspbar nursery thresher. Frost had not yet occurred at time of harvest and many leaves were still green, but pods were ripe and seeds threshed out readily. After threshing the seeds were placed in a forced air dryer at a temperature of 95° F (35° C) until the leaf fragments and other foreign materials were dry after which the foreign material was removed by screening.

The Bradford Farm is located approximately 39° north latitude, 92.5° west longitude, and 750 ft. (228 m) altitude. The temperature and precipitation for the period June through October, 1971 follows:

| | Temperature | | | | | | Number days with maximum temperature | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean Maximum | | Mean Minimum | | Average | | 90 F (32.2 C) or above | 100 F (37.7 C) or above | Precipitation | |
| | F | C | F | C | F | C | | | in | cm |
| June | 87.1 | 30.6 | 63.0 | 17.2 | 75.1 | 23.9 | 9 | 0 | 2.03 | 5.2 |
| July | 85.4 | 29.6 | 62.4 | 16.9 | 73.9 | 23.3 | 6 | 0 | 4.48 | 11.4 |
| August | 85.4 | 29.6 | 61.9 | 16.6 | 73.7 | 23.1 | 11 | 0 | 2.29 | 5.8 |
| September | 81.3 | 27.4 | 58.7 | 14.3 | 70.0 | 21.0 | 11 | 0 | 2.15 | 5.5 |
| October | 74.2 | 23.4 | 50.9 | 10.5 | 62.6 | 17.0 | 1 | 0 | 1.74 | 4.4 |

Date of first killing freeze -- November 3

In contrast to the heavy precipitation in August and September of 1970, August and September of 1971 were relatively dry months.

## AGRONOMIC DATA AND HOW IT WAS OBTAINED

The agronomic data for the mungbean strains are reported in Table 2. Procedures for collecting data and recording notes are as follows:

Yield -- Yields are recorded in kilograms/hectare.

Plant type -- Plant type is a visual rating on a scale of 1 to 5 as follows: 1 = prostrate, 2 = semiprostrate, 3 = intermediate, 4 = semierect, 5 = erect.

Leaf size -- Mature leaves were classified 1 to 8 for size by comparison with charts of leaf outlines varying in area. The leaf size classes and approximate area of each are as follows:

| | | |
|---|---|---|
| 1 = 6.1 sq. cm | 4 = 26.0 sq. cm | 7 = 68.6 sq. cm |
| 2 = 11.8 sq. cm | 5 = 34.0 sq. cm | 8 = 145.1 sq. cm |
| 3 = 17.7 sq. cm | 6 = 54.3 sq. cm | |

Days to flower -- Number of days from planting to first open flower.

Days to ripe -- Number of days from planting to first mature pod.

Plant height -- Average height in cm of the main axis of two randomly selected plants.

Branch length -- Average length in cm of first lateral branch from two randomly selected plants.

Pods/plant -- Average number of pods at time of harvest on three randomly selected plants.

Seeds/pod -- Average number of seeds in ten randomly selected pods.

1,000 seed weight -- Weight in grams of 100 randomly selected seeds multiplied by 10.

Virus score -- Visual estimation on the basis of 1 to 100 of the proportion of the total plot showing virus symptoms identified by leaf mosaic, leaf crinkling, plant stunting, and flower abortion. Identification of the specific virus (or viruses) present could not be made.

Mildew score -- Visual rating for mildew on leaves at maturity based on a score of 1 (resistant) to 5 (susceptible).

## CHEMICAL ANALYSES OF MUNGBEAN SEED

After harvest, seeds from the separate replications were bulked for each strain and a ten gm sample of seed from strains to be analyzed was taken. Damaged seeds and foreign materials were removed by hand picking and the sample ground in an analytical micro mill. All chemical analyses were made in the University of Missouri, Agricultural Experiment Station Laboratories.

Protein and lysine content was determined on 126 mungbean strains harvested in 1971. The data is reported in Table 9. Analyses of 17 amino acids were made on 53 of these strains. This data will be reported in a later publication. Decisions on which strains were to be analyzed were based on yields in 1970 and 1971, and on protein, lysine, and methionine content in 1970. An attempt was made to obtain analyses of the higher yielding strains and to reevaluate the strains that had been superior in protein, lysine, or methionine content in 1970.

Protein -- Nitrogen content of the 126 mungbean strains was determined by the classical Kjeldahl procedure. A single analyses was made on each sample with 10% of the samples rerun to check precision. Protein is expressed as percent (N x 6.25) of the air dry sample.

Amino acids -- Analyses for 17 amino acids were done by automated cation exchange chromatography on 53 mungbean strains. Analyses were made on single samples with

approximately 10% reruns to check for precision. The amino acids are expressed as percent of protein.

Lysine -- Lysine was one of the 17 amino acids obtained by automated cation exchange chromatography on 53 strains. In the additional 73 strains, the lysine was determined by an automated Technicon procedure based on lysine decarboxalase reaction and measurement of the liberated $CO_2$ by a colormetric reaction. Lysine is expressed as percent of protein.

## DISCUSSION OF RESULTS

### Agronomic Data

Data reported are the averages of three replications except for entries where it is noted that less than three replications were grown.

#### Yield

Yields of the mungbean strains grown at Columbia in 1971 ranged from a high of 2548 to a low of 12 kilograms/hectare with a mean of 924 kilograms/hectare. Yields are reported in Table 2 with strains listed in order of accession number. These yields compare with a high yield of 2708 kg/ha and a mean of 777 kg/ha at Columbia in 1970. Nine strains exceeded 2,000 kg/ha and 87 exceeded 1,000 kg/ha.

The 30 (15%) highest yielding strains and the agronomic data obtained on them are listed in Table 4 in order of yield. Of these, 19 originated in India, two in Oklahoma, and one each in Turkey and China. The origins of seven are unknown. M333 was the only new entry in 1971 that was among the 30 highest yielding strains. Two strains, M19 and M221, did not flower in time to produce ripe pods before frost and yields are not reported for these strains.

#### Plant type

We observed that many of the more vigorous and higher yielding strains tended to have a low, prostrate type of growth. This plant type has some disadvantages; pods may touch the ground reducing seed quality and prostrate plants are less desirable for machine harvesting. The strains were visually classified into five plant type classes by scoring entries in each replication on a basis of 1 (prostrate) to 5 (erect) and the scores for the replications averaged. The 20 (10%) highest yielding strains had an average score of 1.8, the 30 (15%) highest yielding strains had an average score of 2.1, while the overall mean was 3.2. Sixty-four strains scored 4 or higher but only 3 of these were among the 30 (15%) highest yielding strains. Four strains scored 5 (erect). All were low yielding strains or did not produce seed due to late flowering.

#### Leaf size

Leaf size was evaluated on a scale of 1 to 8 as described. The strains ranged from 2.8 on the scale to 7.5 with a mean of 5.7. The 20 (10%) highest yielding

strains averaged 6.9 and the 30 (15%) highest yielding strains averaged 6.7. These data suggest that large leaves are favorable for high yields. No data is available on numbers of leaves or total leaf area of a plant.

Days to flower

The mungbean strains varied from 40 to 119 days to first open flower, with a mean of 59 days. Four strains which flowered after 98 days did not mature seed. The 20 (10%) highest yielding strains averaged 57 days and the 30 (15%) highest yielding strains averaged 55 days to first flower. These data confirm the observations made in 1970 that at Columbia, Missouri moderately early flowering is favored for high yields. The early flowering strains do not utilize the full season and will not be the highest yielding strains, while late maturing strains will not have time to set and mature a large enough number of pods before frost to produce a high yield. Since flower abortion is common in some of the virus infected strains, such strains may be given an abnormally high rating for days to first open flower.

Days to ripe

Days from first ripe pod ranged from 56 to 120 days with a mean of 80 days. Four strains did not produce mature pods. The 20 (10%) highest yielding strains averaged 79 days and the 30 (15%) highest yielding strains averaged 77 days. As an average overall, it required 21 days for the pods to mature after flowering.

Height of plants

The height of the 203 strains ranged from 24 to 82 cm with a mean of 58 cm. The 20 (10%) highest yielding strains averaged 67 cm and the 30 (15%) highest yielding strains averaged 66 cm. These data confirm the observation made in 1970 that height is an expression of plant vigor and that there is a relationship between tall (large) plants and high yield. The prostrate plant types are exceptions, for example, M101 ranking 2 in yield with plant type score of 1 and height of 52 cm; M170 ranking 10 in yield with plant type score of 1.3 and height of 52 cm; or M140 ranking 16 in yield with height of 45 cm.

Branch length

Branch length, as with height, is an expression of plant size and vigor and is associated with high yield. The length of the lower lateral branch varied from 13 cm to 76 cm with a mean for the 203 strains of 51 cm. The 20 (10%) highest yielding strains had an average branch length of 64 cm and the 30 (15%) highest yielding strains had an average branch length of 61 cm. Some high yielding strains which were both tall and had long branches are:

| Acc. no. | Yield kg/ha | Height cm | Branch length cm | Plant type |
|---|---|---|---|---|
| M90 | 2548 | 68 | 76 | 1.3 |
| M81 | 2138 | 71 | 75 | 1.7 |

| Acc. no. | Yield kg/ha | Height cm | Branch length cm | Plant type |
|---|---|---|---|---|
| M118 | 2128 | 70 | 73 | 1.7 |
| M233 | 2095 | 82 | 68 | 1.7 |
| M194 | 2042 | 81 | 76 | 1.7 |

High yielding strains which were short and which had short lateral branches are:

| Acc. no. | Yield kg/ha | Height cm | Branch length cm | Plant type |
|---|---|---|---|---|
| M101 | 2150 | 52 | 47 | 1.0 |
| M170 | 1992 | 52 | 58 | 1.3 |
| M138 | 1950 | 57 | 47 | 1.7 |
| M140 | 1864 | 45 | 39 | 3.3 |
| M135 | 1765 | 49 | 49 | 3.3 |
| M146 | 1681 | 59 | 49 | 4.0 |
| M121 | 1611 | 44 | 38 | 4.0 |

The latter four strains were classified as intermediate to semierect, whereas the other strains were classified as prostrate to semiprostrate. In this experiment, strains with long branch length may have been favored by the wide spacing within and between rows.

Pods per plant

Pods per plant is one of the components of yield. The number of pods per plant was recorded on 199 strains and varied from 4 to 235 with a mean of 115. The 10 strains with highest number of pods per plant were M4 (235), M173 (232), M170 (226), M90 (219), M194 (217), M330 (214), M111 (212), M174 (188), M213 (188), and M293 (186). The 20 (10%) highest yielding strains averaged 150 pods per plant and the 30 (15%) highest yielding strains averaged 145 pods per plant. The coefficient of variability was extremely high for this character. Only 5 of the 10 strains highest for number of pods per plant (M4, M170, M90, M194, and M174) were among the 30 highest yielding strains. The wide spacing in this experiment tended to favor a higher pod set per plant. Factors reducing pod number were late flowering and high virus infection.

Seeds per pod

Seeds per pod is a second component of yield. Seeds per pod were recorded on 199 strains and varied from 5 to 14 with an overall mean of 10.7. Three strains (M132, M317, and M329) averaged 14 seeds per pod. Twelve strains (M4, M98, M103, M105, M111, M206, M304, M312, M340, M347, M350, M358) averaged 13 seeds per pod. Only three of the above strains (M132, M4, and M206) were among the 30 (15%) highest

yielding strains. The 30 (15%) highest yielding strains averaged 11.5 seeds per pod. Strains with high virus infection tended to have reduced number of seeds per pod.

1,000 seed weight

Seed weight is a third component of yield. The 1,000 seed weight was recorded on 198 strains. They ranged from a 1,000 seed weight of 24 gm to 75 gm with a mean of 45 gm. The 10 strains with highest seed weight were M101 (75 gm), M14 (70 gm), M15 (69 gm), M97 (69 gm), M348 (69 gm), M98 (67 gm), M183 (67 gm), M330 (67 gm), M90 (66 gm), and M232 (66 gm). Five of the above strains (M101, M14, M183, M90, M232) are among the 30 (15%) highest yielding strains. The 20 (10%) highest yielding strains averaged 61 gm and the 30 (15%) highest yielding strains averaged 57 gm per 1,000 seed weight. These data suggest that high seed weight is required for high yield.

Virus score

Virus symptoms -- leaf mosaic, leaf crinkling, plant stunting, and flower abortion -- were noted in many strains. The particular virus, or viruses, were not identified. None of the leaf yellowing symptoms characteristic of bean yellow mosaic virus (BYMV) was present. The virus score reported is a visual rating on a scale of 1 to 100 of the overall appearance of the plot with regard to the symptoms listed above. We cannot verify that all of the symptoms observed were the result of a virus and not from other causes. Only 2 strains (M118 and M221) were given a zero rating in all replications. M101, M174, and M235 received a rating of 2. Six strains, M81, M90, M194, M238, M310, and M339 received a rating of 3. Twenty-seven strains were rated 10 or under and 60 strains 20 or under. Thirty-two strains were rated over 60 with a maximum rating of 72. The 20 (10%) highest yielding strains averaged 7.9 and the 30 (15%) highest yielding strains averaged 10.5. Overall, the mean for the 203 strains was 34.1. Resistance to the virus (or viruses) appears to be paramount for high yield. It appears that the virus is reducing pod number (as a result of flower abortion) and number of seeds per pod. It also appears that the flower abortion and failure to set seed in some strains may result in their being given an abnormally high rating for days to flower and days to first ripe pod.

Mildew score

Mildew did not develop until late in the season but became widespread in the nursery before harvest. Strains were scored on a scale of 1 (resistant) to 5 (susceptible). M221 received a score of 1 and M243 a score of 1.7. Five strains (M210, M319, M330, M358, M366) received scores of 2. Twelve strains received scores of 2.3. The 20 (10%) highest yielding strains averaged 3.0, the 30 (15%) highest yielding strains averaged 3.2, and the average for the 203 strains was 3.6. Mildew did not have as adverse effect on yield as did the virus complex.

Chemical Analyses

Procedures for preparing the samples and making the analyses have been described above.

**Protein**

Protein content of the 126 mungbean strains analyzed ranged from 22.1% to 31.2% on an air dry basis, with a mean of 26.5%. The 20 (10%) high yielding strains averaged 26.0% protein and the 30 (15%) high yielding strains also averaged 26.0% protein. Strain M153 which ranked 13th in yield, ranked 11th in protein with 28.2% protein. Strain M234 which ranked 25th in yield ranked 4th in protein with 28.8% protein. The three strains with the highest protein, M25, M36, and M227, yielded only 255, 245, and 303 kg/ha, respectively. They also had small seeds with 1,000 seed weights of 24, 28, and 37 grams, respectively.

**Lysine**

Lysine content expressed as percent of protein for the 126 mungbean strains ranged from 5.90% to 8.45% with a mean 7.27%. The 20 (10%) high yielding strains averaged 7.03% and the 30 (15%) high yielding strains averaged 7.16% lysine. Strain M81 which ranked 3rd in yield ranked highest in lysine content with 8.45% and M121 which ranked 26th in yield ranked 4th with 7.97% lysine (as percent of protein). None of the strains ranked high in both protein and lysine. By contrast, M25, which ranked 1st in protein ranked 117th in lysine, M36 which ranked 2nd in protein ranked 125th in lysine, M227 which ranked 3rd in protein ranked 111th in lysine, M130 which ranked 5th in protein ranked 119th in lysine, and M164 which ranked 6th in protein ranked 107th in lysine.

Table 1
List of mungbean
*Phaseolus aureus*, Roxb., Accessions Tested at
Columbia, Missouri, 1971

| Mo. Acc. No. | USDA PI No. | Name of Accession | Origin of Accession | Source of Seed |
|---|---|---|---|---|
| M1 | 368265 | 24-3 | India | UMC, 1970 |
| M2 | 368266 | Baisakhi | India (Same as M13, M73) | UMC, 1970 |
| M4 | 368268 | Shining Moong 1 | India | UMC, 1970 |
| M6 | 368270 | Moong 305 | India | UMC, 1970 |
| M12 | 368276 | T-44 | India | UMC, 1970 |
| M13 | 368277 | Baisakhi | India (Same as M2, M73) | UMC, 1970 |
| M14 | 368278 | Jalagaon 781 | India | UMC, 1970 |
| M15 | 368279 | | Taiwan | UMC, 1970 |
| M18 | 368282 | Jharsuguda 2-3 | India | UMC, 1970 |
| M19 | | Jharsuguda 3-2 | India | UMC, 1970 |
| M20 | 368283 | Jharsuguda 4-8 | India | UMC, 1970 |
| M25 | 368288 | Bhatili 3-4 | India | UMC, 1970 |
| M27 | 368290 | Bhatili 2-7 | India | UMC, 1970 |
| M28 | 368291 | Bhatili 2-3-7 | India | UMC, 1970 |
| M29 | 368292 | Kendrapada 1-2 | India | UMC, 1970 |
| M36 | 368297 | Kusumi 1-7 | India | UMC, 1970 |
| M38 | 368299 | Kusumi 1-10 | India | UMC, 1970 |
| M40 | 368301 | Banpur 1-4 | India | UMC, 1970 |
| M45 | 368305 | Kaira 1-2 | India | UMC, 1970 |
| M61 | 368317 | Kopergaon | India | UMC, 1970 |
| M62 | 368318 | T-51 | India | UMC, 1970 |
| M63 | 368319 | K-11 | India | UMC, 1970 |
| M65 | 368321 | D-2-15 | India | UMC, 1970 |
| M67 | 368323 | NP-23 | India | UMC, 1970 |
| M68 | 368324 | RS-4 | India | UMC, 1970 |
| M69 | 368325 | RS-5 | India | UMC, 1970 |
| M71 | 368327 | T-1 | India | UMC, 1970 |
| M73 | 368329 | Baisakhi | India (Same as M2, M13) | UMC, 1970 |
| M75 | | Kiloga | Okla. St. Univ. 1 | UMC, 1970 |
| M76 | | Oklahoma 12 | Okla. St. Univ. 3 | UMC, 1970 |
| M78 | | Jumbo | Okla. St. Univ. 46 | UMC, 1970 |
| M79 | | Texas Jumbo | Okla. St. Univ. 48 | UMC, 1970 |
| M81 | | EB-6 | Okla. St. Univ. 51 | UMC, 1970 |
| M90 | 223711 | | India | UMC, 1970 |
| M91 | 223802 | | India | UMC, 1970 |

Page 2 (Table 1, Continued)

| Mo. Acc. No. | USDA PI No. | Name of Accession | Origin of Accession | Source of Seed |
|---|---|---|---|---|
| M95 | | OAEM 53-1 | Okla. St. Univ. 151 | UMC, 1970 |
| M97 | | Bekken | Okla. St. Univ. 339 | UMC, 1970 |
| M98 | | OAEM 56-4 | Okla. St. Univ. 349 | UMC, 1970 |
| M99 | | OAEM 59-6 | Okla. St. Univ. 660 | UMC, 1970 |
| M101 | 271401 | | India | UMC, 1970 |
| M102 | 271402 | | India | UMC, 1970 |
| M103 | 271406 | | India | UMC, 1970 |
| M104 | 271407 | | India | UMC, 1970 |
| M105 | 271492 | | India | UMC, 1970 |
| M107 | 271408 | | India | UMC, 1970 |
| M108 | 271490 | | India | UMC, 1970 |
| M109 | | | Peru | UMC, 1970 |
| M110 | 288585 | | | UMC, 1970 |
| M111 | 288586 | | | UMC, 1970 |
| M112 | 274402 | | | UMC, 1970 |
| M115 | 323292 | | | UMC, 1970 |
| M117 | 171435 | | China | UMC, 1970 |
| M118 | 180811 | | India | UMC, 1970 |
| M119 | 183407 | | India | UMC, 1970 |
| M120 | 291365 | | | UMC, 1970 |
| M121 | | OAEM 58-62 | Okla. St. Univ. 212 | UMC, 1970 |
| M122 | | OAEM 58-70 | Okla. St. Univ. 220 | UMC, 1970 |
| M127[a] | | | Korea | Mkt. Seoul |
| M128[a] | | | Hong Ko | Hong Kong |
| M130[a] | | | Hong Ko | Mkt. H.K. |
| M131[a] | | | Hong Ko | Mkt. H.K. |
| M132 | 368330 | Khargaon 1 | India | UMC, 1970 |
| M135 | 31080 | | | UMC, 1970 |
| M136 | 31281 | | | UMC, 1970 |
| M137 | 31287 | | | UMC, 1970 |
| M138 | 31288 | | | UMC, 1970 |
| M139 | 31289 | | | UMC, 1970 |
| M140 | 31290 | | | UMC, 1970 |
| M141 | 31291 | | | UMC, 1970 |
| M142 | 31293 | | | UMC, 1970 |
| M143 | 31321 | | | UMC, 1970 |
| M144 | 31322 | | | UMC, 1970 |
| M146 | 31324 | | | UMC, 1970 |
| M147 | 31325 | | | UMC, 1970 |
| M148 | 31332 | | | UMC, 1970 |
| M149 | 31343 | | | UMC, 1970 |
| M150 | 31344 | | | UMC, 1970 |
| M151 | 31345 | | | UMC, 1970 |

[a] New in 1971

| Mo. Acc. No. | USDA PI No. | Name of Accession | Origin of Accession | Source of Seed |
|---|---|---|---|---|
| M152 | 31569 | | | UMC, 1970 |
| M153 | 31616 | | | UMC, 1970 |
| M155 | 31710 | | | UMC, 1970 |
| M156 | 31728 | | | UMC, 1970 |
| M157 | 140043 | | Brazil | UMC, 1970 |
| M158 | 163051 | | India | UMC, 1970 |
| M163 | 164265 | | India | UMC, 1970 |
| M164 | 164336 | | India | UMC, 1970 |
| M165 | 164392 | | India | UMC, 1970 |
| M166 | 164427 | | India | UMC, 1970 |
| M167 | 164442 | | India | UMC, 1970 |
| M170 | 164725 | | India | UMC, 1970 |
| M172 | 164745 | | India | UMC, 1970 |
| M173 | 164770 | | India | UMC, 1970 |
| M174 | 164775 | | India | UMC, 1970 |
| M175 | 164889 | | Guatemala | UMC, 1970 |
| M176 | 167274 | | Turkey | UMC, 1970 |
| M177 | 173932 | | India | UMC, 1970 |
| M183 | 179399 | | Turkey | UMC, 1970 |
| M193 | 179962 | | India | UMC, 1970 |
| M194 | 180313 | | India | UMC, 1970 |
| M195 | 180315 | | India | UMC, 1970 |
| M196 | 180456 | | India | UMC, 1970 |
| M198 | 180460 | | India | UMC, 1970 |
| M199 | 183063 | | India | UMC, 1970 |
| M202 | 183135 | | India | UMC, 1970 |
| M203 | 183136 | | India | UMC, 1970 |
| M204 | 183337 | | India | UMC, 1970 |
| M205 | 183458 | | India | UMC, 1970 |
| M206 | 183459 | | India | UMC, 1970 |
| M208 | 183936 | | India | UMC, 1970 |
| M210 | 199740 | | Philippines | UMC, 1970 |
| M212 | 201867 | | Iran | UMC, 1970 |
| M213 | 201868 | | Iran | UMC, 1970 |
| M214 | 201869 | | Iran | UMC, 1970 |
| M215 | 201870 | | Iran | UMC, 1970 |
| M218 | 201873 | | Iran | UMC, 1970 |
| M219 | 201874 | | Iran | UMC, 1970 |
| M221 | 207655 | | Philippines | UMC, 1970 |
| M227 | 211735 | | Afghanistan | UMC, 1970 |
| M232 | 212907 | | India | UMC, 1970 |
| M233 | 212908 | | India | UMC, 1970 |
| M234 | 213012 | | India | UMC, 1970 |
| M235 | 213015 | | India | UMC, 1970 |
| M237 | 214063 | | India | UMC, 1970 |
| M238 | 214334 | | India | UMC, 1970 |
| M241 | 217953 | | Pakistan | UMC, 1970 |

c/ One replication only

| Mo. Acc. No. | USDA PI No. | Name of Accession | Origin of Accession | Source of Seed |
|---|---|---|---|---|
| M243 | 217955 | | Pakistan | UMC, 1970 |
| M248 | 219699 | | Pakistan | UMC, 1970 |
| M252 | 220305 | | Afghanistan | UMC, 1970 |
| M254 | 220672 | | Afghanistan | UMC, 1970 |
| M255 | 220815 | | Afghanistan | UMC, 1970 |
| M257 | 222116 | | Afghanistan | UMC, 1970 |
| M260 | 223002 | | Iran | UMC, 1970 |
| M261 | 223003 | | Iran | UMC, 1970 |
| M263 | 223281 | | Afghanistan | UMC, 1970 |
| M264 | 223282 | | Afghanistan | UMC, 1970 |
| M266 | 223523 | | Afghanistan | UMC, 1970 |
| M268 | 226520 | | Iran | UMC, 1970 |
| M271 | 227754 | | Guatemala | UMC, 1970 |
| M274 | 229708 | | | UMC, 1970 |
| M277 | 246130 | | Madagascar | UMC, 1970 |
| M280 | 251035 | | Iran | UMC, 1970 |
| M281 | 251036 | | Iran | UMC, 1970 |
| M290 | 264686 | | Philippines | UMC, 1970 |
| M291 | 268412 | | Afghanistan | UMC, 1970 |
| M293 | 269521 | | Pakistan | UMC, 1970 |
| M297 | 271403 | | India | UMC, 1970 |
| M298 | 271404 | | India | UMC, 1970 |
| M299 | 271405 | | India | UMC, 1970 |
| M300 | 271491 | | India | UMC, 1970 |
| M304 | 273487 | | Korea | UMC, 1970 |
| M305 | 274305 | | Pakistan | UMC, 1970 |
| M306 | 276364 | | India | UMC, 1970 |
| M307 | 276365 | | India | UMC, 1970 |
| M308 | 276366 | | India | UMC, 1970 |
| M310 | 282991 | | India | UMC, 1970 |
| M311 | 286297 | | Ivory Coast | UMC, 1970 |
| M312 | 286298 | | Ivory Coast | UMC, 1970 |
| M317 | 298915 | | China | UMC, 1970 |
| M318 | 298917 | | U.S.A. | UMC, 1970 |
| M319 | 305070 | | Thailand | UMC, 1970 |
| M323 | 305075 | | Thailand | UMC, 1970 |
| M326 | 317463 | | Afghanistan | UMC, 1970 |
| M328 | 317465 | | Afghanistan | UMC, 1970 |
| M329 | 368333 | Jumbo | U.S.A. | UMC, 1970 |
| M330[a] | | | India | Mkt. Patna |
| M331[a] | | Kalamung | India | India |
| M333[a] | | | Mkt. Calcutta | India |
| M334[a] | | | Thailand | Mkt. Bangkok |
| M335[a] | | | Thailand | Mkt. Bangkok |

[a] New in 1971

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| Mo. Acc. No. | USDA PI No. | Name of Accession | Origin of Accession | Source of Seed |
|---|---|---|---|---|
| M337[ac] | 362315 | Jaerae 4 | Korea | RDD/Korea |
| M338[ab] | 362313 | Chungnamchaerae | Korea | RDD/Korea |
| M339[ab] | 362327 | Myungnokdu | Korea | RDD/Korea |
| M340[ac] | 362318 | Kanguonjaerae 2 | Korea | RDD/Korea |
| M341[ab] | 362328 | Nogduja | Korea | RDD/Korea |
| M342[ab] | 362316 | Jaeraechong 1 | Korea | RDD/Korea |
| M343[ab] | 362317 | Jaeraejong 3 | Korea | RDD/Korea |
| M344[ab] | 362296 | Chaeraejong 4 | Korea | RDD/Korea |
| M345[ac] | 362297 | Chaeraejong 7 | Korea | RDD/Korea |
| M346[a] | 362298 | Chaeraejong 8 | Korea | RDD/Korea |
| M347[ab] | 362319 | Kyungkijaerae 1 | Korea | RDD/Korea |
| M348[ab] | 362320 | Kyungkijaerae 2 | Korea | RDD/Korea |
| M349[ab] | 362321 | Kyungkijaerae 3 | Korea | RDD/Korea |
| M350[ab] | 362322 | Kyungkijaerae 5 | Korea | RDD/Korea |
| M351[a] | 362323 | Kyungkijaerae 8 | Korea | RDD/Korea |
| M352[ab] | 362324 | Kyungkijaerae 10 | Korea | RDD/Korea |
| M353[ac] | 362325 | Kyungkijaerae 16 | Korea | RDD/Korea |
| M354[ac] | 362326 | Kyungkijaerae 18 | Korea | RDD/Korea |
| M355[ab] | | Chunbukjaerae 1 | Korea | RDD/Korea |
| M356[ac] | 362299 | Chunbukjaerae 2 | Korea | RDD/Korea |
| M357[ac] | 362300 | Chunbukjaerae 3 | Korea | RDD/Korea |
| M358[ac] | 362301 | Chunbukjaerae 4 | Korea | RDD/Korea |
| M359[ab] | 362302 | Chunbukjaerae 5 | Korea | RDD/Korea |
| M360[ab] | 362303 | Chunbukjaerae 6 | Korea | RDD/Korea |
| M361[ab] | 362304 | Chunbukjaerae 7 | Korea | RDD/Korea |
| M362[ab] | 362305 | Chunbukjaerae 9 | Korea | RDD/Korea |
| M363[ac] | 362306 | Chunbukjaerae 10 | Korea | RDD/Korea |
| M364[ab] | 362307 | Chunbukjaerae 12 | Korea | RDD/Korea |
| M365[a] | 362308 | Chunbukjaerae 13 | Korea | RDD/Korea |
| M366[ac] | 362309 | Chunbukjaerae 14 | Korea | RDD/Korea |
| M367[a] | 362310 | Chunbukjaerae 17 | Korea | RDD/Korea |
| M368[ab] | 362311 | Chunbukjaerae 20 | Korea | RDD/Korea |
| M369[ac] | 362312 | Chunbukjaerae 21 | Korea | RDD/Korea |
| M370[a] | | Chunbukjaerae 18 | Korea | RDD/Korea |

a. New in 1971

b. Two replications only

c. One replication only

Table 2
Agronomic Data on Mungbean Accessions
Grown at Columbia, Missouri in 1971

| No. Acc. No. | Yield Kg/ha | Plant type | Leaf size | Days to flower | Days to ripe | Hgt. cm. | Branch length cm | Pods per plant | Seeds per pod | 1,000 seed wt. gm. | Virus score | Mildew score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1 | 347.6 | 3.0 | 3.6 | 68 | 85 | 55 | 51 | 85 | 9 | 30 | 62 | 3.3 |
| M2 | 590.8 | 3.7 | 6.3 | 48 | 70 | 45 | 41 | 62 | 11 | 37 | 37 | 5.0 |
| M4 | 1881.6 | 1.3 | 6.4 | 52 | 74 | 56 | 58 | 235 | 13 | 60 | 10 | 3.3 |
| M6 | 361.2 | 3.3 | 5.8 | 68 | 89 | 77 | 50 | 100 | 9 | 35 | 58 | 3.7 |
| M12 | 592.4 | 3.0 | 5.8 | 46 | 69 | 42 | 37 | 90 | 10 | 44 | 22 | 5.0 |
| M13 | 863.5 | 3.7 | 6.0 | 43 | 64 | 49 | 39 | 97 | 11 | 38 | 20 | 4.3 |
| M14 | 1792.3 | 2.0 | 7.0 | 63 | 83 | 76 | 65 | 90 | 11 | 70 | 8 | 2.7 |
| M15 | 1181.6 | 3.3 | 7.0 | 49 | 72 | 59 | 53 | 116 | 10 | 69 | 22 | 3.7 |
| M18 | 160.3 | 3.0 | 3.7 | 67 | 87 | 34 | 24 | 92 | 8 | 28 | 55 | 4.0 |
| M19 | | 3.7 | 4.9 | 104 | 120 | 46 | 43 | | | | 65 | 3.0 |
| M20 | 142.7 | 3.0 | 4.2 | 60 | 81 | 35 | 24 | 87 | 11 | 30 | 38 | 4.0 |
| M25 | 255.1 | 3.0 | 4.1 | 65 | 85 | 45 | 41 | 106 | 9 | 24 | 47 | 4.3 |
| M27 | 882.6 | 3.0 | 2.8 | 74 | 93 | 24 | 13 | 30 | 6 | 26 | 23 | 3.0 |
| M28 | 80.5 | 3.0 | 3.6 | 70 | 89 | 24 | 21 | 43 | 10 | 25 | 33 | 3.3 |
| M29 | 287.0 | 3.0 | 5.0 | 58 | 79 | 43 | 38 | 85 | 10 | 25 | 33 | 4.0 |
| M36 | 245.6 | 3.0 | 3.5 | 64 | 85 | 36 | 33 | 101 | 9 | 28 | 32 | 4.7 |
| M38 | 55.0 | 3.0 | 3.7 | 71 | 91 | 27 | 22 | 75 | 8 | 30 | 68 | 2.7 |
| M40 | 401.0 | 3.0 | 4.4 | 63 | 84 | 39 | 35 | 116 | 8 | 26 | 60 | 4.0 |
| M45 | 207.3 | 3.0 | 5.2 | 60 | 81 | 38 | 30 | 106 | 10 | 31 | 43 | 3.7 |
| M61 | 1294.8 | 4.0 | 6.9 | 52 | 74 | 68 | 63 | 123 | 11 | 54 | 25 | 4.0 |
| M62 | 593.2 | 4.0 | 5.7 | 52 | 73 | 54 | 48 | 115 | 11 | 35 | 40 | 4.0 |
| M63 | 444.9 | 3.3 | 4.8 | 55 | 78 | 48 | 41 | 130 | 10 | 40 | 43 | 3.7 |
| M65 | 505.5 | 3.7 | 5.9 | 65 | 85 | 55 | 48 | 154 | 11 | 45 | 62 | 4.0 |
| M67 | 172.2 | 3.3 | 4.8 | 58 | 80 | 54 | 43 | 66 | 8 | 25 | 62 | 4.0 |
| M68 | 308.6 | 3.3 | 5.5 | 75 | 98 | 59 | 60 | 100 | 9 | 30 | 63 | 3.3 |
| M69 | 376.3 | 3.0 | 5.6 | 67 | 88 | 56 | 51 | 95 | 10 | 34 | 62 | 3.7 |
| M71 | 724.7 | 3.0 | 5.6 | 48 | 70 | 35 | 31 | 69 | 11 | 38 | 15 | 4.3 |
| M73 | 1319.5 | 4.0 | 6.5 | 46 | 71 | 50 | 44 | 175 | 11 | 44 | 10 | 4.3 |
| M75 | 1074.8 | 3.7 | 5.6 | 50 | 72 | 52 | 43 | 114 | 11 | 52 | 27 | 4.0 |
| M76 | 1079.5 | 3.3 | 4.9 | 46 | 69 | 45 | 34 | 150 | 11 | 41 | 27 | 4.7 |
| M78 | 846.7 | 3.7 | 6.3 | 65 | 86 | 71 | 54 | 131 | 12 | 53 | 30 | 3.0 |
| M79 | 1408.8 | 4.0 | 5.9 | 54 | 76 | 69 | 60 | 162 | 11 | 51 | 27 | 4.0 |
| M81 | 2137.6 | 1.7 | 6.7 | 60 | 82 | 71 | 75 | 110 | 11 | 62 | 3 | 2.3 |
| M90 | 2548.2 | 1.3 | 7.2 | 62 | 83 | 68 | 76 | 219 | 11 | 66 | 3 | 2.7 |
| M91 | 780.6 | 3.3 | 5.0 | 72 | 94 | 78 | 65 | 166 | 11 | 49 | 65 | 3.3 |
| M95 | 1338.7 | 2.3 | 6.2 | 55 | 78 | 55 | 49 | 130 | 12 | 42 | 20 | 4.0 |
| M97 | 1343.4 | 4.0 | 6.5 | 52 | 75 | 60 | 50 | 117 | 11 | 69 | 30 | 3.7 |
| M98 | 747.9 | 2.7 | 7.0 | 63 | 85 | 65 | 49 | 72 | 13 | 67 | 25 | 3.0 |
| M99 | 1179.2 | 4.0 | 5.4 | 44 | 68 | 43 | 38 | 146 | 11 | 44 | 32 | 4.3 |
| M101 | 2150.3 | 1.0 | 7.1 | 52 | 74 | 52 | 47 | 113 | 12 | 75 | 2 | 2.3 |
| M102 | 227.2 | 3.7 | 5.7 | 45 | 67 | 66 | 54 | 141 | 11 | 39 | 52 | 3.3 |

Table 2 (Continued)

| Mo. Acc. No. | Yield Kg/ha | Plant type | Leaf size | Days to flower | Days to ripe | Hgt. cm. | Branch length cm | Pods per plant | Seeds per pod | 1,000 seed wt. gm. | Virus score | Mildew score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M103 | 1347.4 | 3.3 | 6.1 | 52 | 78 | 61 | 44 | 89 | 13 | 50 | 18 | 3.3 |
| M104 | 937.6 | 3.3 | 5.9 | 56 | 80 | 56 | 51 | 153 | 10 | 42 | 35 | 3.3 |
| M105 | 1398.5 | 4.0 | 6.3 | 54 | 77 | 64 | 54 | 103 | 13 | 54 | 18 | 3.7 |
| M107 | 1521.2 | 3.3 | 6.7 | 58 | 79 | 63 | 53 | 130 | 11 | 64 | 17 | 4.0 |
| M108 | 1370.6 | 2.0 | 6.7 | 57 | 79 | 67 | 58 | 163 | 12 | 56 | 18 | 4.0 |
| M109 | 1451.1 | 1.3 | 6.9 | 48 | 69 | 65 | 61 | 105 | 11 | 48 | 18 | 2.7 |
| M110 | 1437.5 | 3.3 | 6.2 | 54 | 76 | 70 | 59 | 73 | 12 | 48 | 27 | 4.0 |
| M111 | 1526.0 | 1.0 | 5.6 | 57 | 80 | 60 | 52 | 212 | 13 | 39 | 15 | 3.0 |
| M112 | 228.8 | 3.3 | 4.3 | 63 | 83 | 45 | 38 | 76 | 9 | 34 | 50 | 4.0 |
| M115 | 663.8 | 3.7 | 5.4 | 49 | 72 | 52 | 40 | 102 | 9 | 34 | 17 | 4.7 |
| M117 | 1574.7 | 2.0 | 6.8 | 52 | 74 | 60 | 55 | 164 | 12 | 52 | 18 | 4.0 |
| M118 | 2128.0 | 1.7 | 7.0 | 64 | 87 | 70 | 73 | 108 | 11 | 65 | 0 | 2.3 |
| M119 | 111.4 | 4.0 | 5.7 | 54 | 76 | 67 | 54 | 105 | 11 | 54 | 23 | 4.0 |
| M120 | 1521.2 | 1.7 | 6.5 | 45 | 66 | 53 | 45 | 120 | 12 | 57 | 27 | 4.0 |
| M121 | 1611.3 | 4.0 | 5.8 | 45 | 67 | 44 | 38 | 150 | 11 | 39 | 28 | 4.3 |
| M122 | 1259.7 | 3.7 | 5.6 | 47 | 69 | 42 | 39 | 125 | 11 | 43 | 33 | 3.7 |
| M127[a] | 590.0 | 4.0 | 5.8 | 56 | 77 | 57 | 41 | 72 | 10 | 46 | 42 | 4.0 |
| M128[a] | 135.5 | 4.7 | 5.9 | 60 | 86 | 65 | 48 | 90 | 8 | 61 | 57 | 3.3 |
| M130[a] | 242.4 | 4.7 | 5.7 | 54 | 83 | 72 | 55 | 95 | 9 | 65 | 58 | 3.7 |
| M131[a] | 238.4 | 4.7 | 6.4 | 63 | 88 | 62 | 38 | 66 | 8 | 58 | 52 | 2.7 |
| M132 | 2011.6 | 2.0 | 6.5 | 54 | 76 | 74 | 58 | 128 | 14 | 50 | 12 | 4.0 |
| M135 | 1765.2 | 3.3 | 6.1 | 44 | 69 | 49 | 49 | 121 | 12 | 42 | 20 | 3.7 |
| M136 | 1786.7 | 2.7 | 5.7 | 49 | 71 | 63 | 58 | 160 | 10 | 51 | 10 | 3.7 |
| M137 | 1218.3 | 3.7 | 5.7 | 43 | 66 | 45 | 43 | 155 | 11 | 43 | 27 | 4.3 |
| M138 | 1950.2 | 1.7 | 6.5 | 46 | 70 | 57 | 47 | 135 | 11 | 61 | 10 | 4.0 |
| M139 | 1486.2 | 2.3 | 6.2 | 45 | 68 | 50 | 52 | 185 | 12 | 53 | 18 | 4.3 |
| M140 | 1864.1 | 3.3 | 6.2 | 43 | 66 | 45 | 39 | 180 | 11 | 53 | 17 | 3.7 |
| M141 | 812.4 | 4.0 | 5.6 | 50 | 74 | 55 | 51 | 143 | 11 | 46 | 45 | 3.7 |
| M142 | 1340.3 | 2.0 | 6.4 | 52 | 74 | 65 | 55 | 139 | 12 | 43 | 22 | 3.7 |
| M143 | 1114.6 | 4.0 | 6.1 | 54 | 78 | 65 | 55 | 120 | 12 | 48 | 33 | 3.3 |
| M144 | 1055.6 | 3.3 | 5.5 | 50 | 72 | 44 | 36 | 114 | 11 | 40 | 42 | 4.0 |
| M146 | 1680.7 | 4.0 | 5.9 | 53 | 75 | 59 | 49 | 139 | 12 | 58 | 32 | 4.7 |
| M147 | 1436.7 | 4.0 | 5.7 | 52 | 76 | 66 | 59 | 80 | 11 | 54 | 25 | 4.0 |
| M148 | 1443.1 | 3.7 | 5.8 | 46 | 70 | 44 | 38 | 90 | 11 | 39 | 23 | 4.7 |
| M149 | 1144.1 | 4.0 | 6.0 | 53 | 74 | 67 | 64 | 86 | 12 | 46 | 23 | 4.7 |
| M150 | 1005.4 | 4.0 | 5.6 | 52 | 77 | 66 | 58 | 89 | 10 | 43 | 25 | 4.3 |
| M151 | 1165.7 | 4.0 | 5.9 | 45 | 68 | 43 | 39 | 106 | 12 | 45 | 30 | 4.3 |
| M152 | 1249.4 | 3.7 | 5.8 | 45 | 67 | 40 | 29 | 112 | 12 | 40 | 8 | 4.0 |
| M153 | 1943.4 | 4.0 | 5.8 | 47 | 69 | 74 | 64 | 116 | 12 | 57 | 25 | 4.0 |
| M155 | 1514.1 | 4.0 | 6.2 | 52 | 74 | 70 | 59 | 147 | 12 | 53 | 22 | 4.3 |
| M156 | 1594.6 | 3.3 | 5.6 | 55 | 77 | 66 | 57 | 119 | 12 | 55 | 25 | 4.0 |
| M157 | 1115.4 | 4.0 | 5.8 | 58 | 79 | 60 | 56 | 88 | 12 | 57 | 20 | 4.3 |
| M158 | 130.4 | 2.3 | 4.4 | 80 | 102 | 55 | 41 | 17 | 8 | 39 | 63 | 2.7 |
| M163 | 19.1 | 3.0 | 4.9 | 80 | 105 | 50 | 40 | 5 | 9 | 25 | 65 | 2.7 |
| M164 | 1023.7 | 4.0 | 6.2 | 57 | 80 | 54 | 44 | 113 | 11 | 45 | 28 | 3.3 |
| M165 | 350.0 | 3.0 | 5.5 | 68 | 89 | 63 | 53 | 51 | 9 | 30 | 58 | 3.7 |

[a] new in 1971

Table 2 (Continued)

| No. Acc. No. | Yield Kg/ha | Plant type | Leaf size | Days to flower | Days to ripe | Hgt cm. | Branch length cm. | Pods per plant | Seeds per pod | 1,000 seed wt. gm. | Virus score | Mildew score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M166 | 1217.5 | 4.0 | 6.3 | 57 | 79 | 73 | 64 | 103 | 10 | 47 | 27 | 4.7 |
| M167 | 236.0 | 3.3 | 4.7 | 68 | 91 | 56 | 50 | 61 | 8 | 37 | 68 | 4.0 |
| M170 | 1991.6 | 1.3 | 7.0 | 54 | 77 | 52 | 58 | 226 | 12 | 50 | 10 | 3.7 |
| M172 | 855.5 | 3.3 | 6.1 | 49 | 71 | 58 | 43 | 85 | 11 | 40 | 30 | 4.0 |
| M173 | 881.8 | 3.7 | 5.7 | 54 | 77 | 57 | 50 | 232 | 11 | 50 | 33 | 3.7 |
| M174 | 1807.5 | 1.3 | 7.5 | 62 | 84 | 78 | 69 | 188 | 11 | 63 | 2 | 2.3 |
| M175 | 913.7 | 3.7 | 5.3 | 48 | 70 | 44 | 42 | 107 | 11 | 45 | 43 | 4.0 |
| M176 | 265.5 | 2.7 | 4.9 | 69 | 95 | 76 | 62 | 54 | 9 | 28 | 67 | 3.3 |
| M177 | 767.0 | 3.3 | 5.0 | 66 | 86 | 75 | 69 | 89 | 11 | 33 | 43 | 3.7 |
| M183 | 1926.3 | 1.7 | 7.2 | 62 | 81 | 69 | 66 | 91 | 10 | 67 | 12 | 2.3 |
| M193 | 932.0 | 3.3 | 6.6 | 53 | 76 | 74 | 56 | 71 | 12 | 49 | 33 | 4.3 |
| M194 | 2041.9 | 1.7 | 7.2 | 60 | 81 | 81 | 76 | 217 | 11 | 61 | 3 | 3.0 |
| M195 | 1949.4 | 1.7 | 7.2 | 63 | 85 | 62 | 72 | 171 | 11 | 62 | 8 | 2.3 |
| M196 | 189.8 | 3.0 | 5.6 | 66 | 88 | 55 | 51 | 72 | 9 | 28 | 65 | 4.0 |
| M198 | 1058.8 | 3.3 | 6.2 | 56 | 77 | 57 | 41 | 151 | 10 | 42 | 22 | 3.7 |
| M199 | 1105.9 | 4.0 | 5.7 | 58 | 80 | 60 | 60 | 141 | 10 | 42 | 35 | 3.7 |
| M202 | 1310.0 | 4.0 | 5.8 | 54 | 77 | 65 | 54 | 161 | 12 | 51 | 38 | 3.7 |
| M203 | 1610.5 | 1.3 | 7.1 | 57 | 79 | 81 | 75 | 133 | 12 | 63 | 10 | 2.3 |
| M204 | 661.8 | 2.3 | 5.4 | 63 | 84 | 71 | 58 | 125 | 12 | 36 | 42 | 4.0 |
| M205 | 810.1 | 2.7 | 6.0 | 56 | 78 | 68 | 49 | 125 | 11 | 43 | 33 | 3.7 |
| M206 | 1801.1 | 1.3 | 6.8 | 64 | 85 | 68 | 65 | 113 | 13 | 35 | 10 | 3.3 |
| M208 | 794.9 | 2.3 | 5.9 | 50 | 71 | 66 | 62 | 129 | 11 | 32 | 22 | 3.7 |
| M210 | 238.0 | 4.0 | 5.7 | 75 | 95 | 56 | 46 | 85 | 9 | 50 | 43 | 2.0 |
| M212 | 695.2 | 4.0 | 6.4 | 49 | 72 | 62 | 48 | 116 | 10 | 34 | 37 | 3.7 |
| M213 | 511.9 | 2.3 | 5.4 | 75 | 97 | 64 | 63 | 188 | 12 | 32 | 62 | 3.0 |
| M214 | 1559.5 | 2.0 | 6.8 | 51 | 73 | 66 | 63 | 155 | 12 | 56 | 23 | 4.0 |
| M215 | 659.4 | 2.3 | 5.6 | 69 | 89 | 71 | 65 | 84 | 11 | 40 | 65 | 3.7 |
| M218 | 655.4 | 2.3 | 4.7 | 68 | 89 | 65 | 60 | 130 | 11 | 34 | 57 | 3.7 |
| M219 | 771.0 | 4.0 | 5.4 | 55 | 77 | 58 | 43 | 77 | 12 | 53 | 37 | 4.0 |
| M221[c] | | 5.0 | 7.0 | 99 | | 45 | 21 | | | | 0 | 1.0 |
| M227 | 303.0 | 3.0 | 3.7 | 72 | 96 | 52 | 50 | 108 | 9 | 37 | 65 | 3.0 |
| M232 | 1849.7 | 2.0 | 7.3 | 53 | 77 | 73 | 70 | 131 | 11 | 66 | 10 | 3.0 |
| M233 | 2094.5 | 1.7 | 7.1 | 55 | 79 | 82 | 68 | 141 | 12 | 65 | 8 | 2.7 |
| M234 | 1673.5 | 3.3 | 5.9 | 52 | 77 | 70 | 56 | 139 | 11 | 43 | 17 | 3.7 |
| M235 | 2005.2 | 1.3 | 7.2 | 61 | 83 | 65 | 62 | 135 | 11 | 63 | 2 | 2.3 |
| M237 | 1348.2 | 4.0 | 5.9 | 50 | 71 | 60 | 55 | 147 | 11 | 37 | 25 | 4.0 |
| M238 | 2018.8 | 1.0 | 7.1 | 61 | 84 | 71 | 68 | 145 | 12 | 60 | 3 | 3.0 |
| M241 | 272.7 | 3.7 | 4.8 | 74 | 94 | 59 | 55 | 69 | 9 | 34 | 60 | 3.7 |
| M243 | 156.3 | 2.0 | 5.2 | 77 | 101 | 51 | 48 | 65 | 5 | 39 | 35 | 1.7 |
| M248 | 472.0 | 3.7 | 5.8 | 63 | 83 | 55 | 50 | 144 | 10 | 33 | 45 | 4.0 |
| M252 | 481.6 | 3.0 | 4.7 | 72 | 94 | 64 | 62 | 131 | 9 | 38 | 65 | 3.0 |
| M254 | 558.9 | 2.0 | 4.8 | 70 | 95 | 67 | 60 | 108 | 10 | 35 | 63 | 3.0 |
| M255 | 204.9 | 2.3 | 3.7 | 70 | 93 | 38 | 38 | 111 | 8 | 38 | 72 | 2.7 |
| M257 | 515.9 | 2.0 | 4.8 | 69 | 90 | 69 | 76 | 168 | 9 | 36 | 37 | 3.3 |
| M260 | 369.9 | 2.3 | 4.9 | 72 | 95 | 51 | 48 | 182 | 10 | 31 | 62 | 3.0 |
| M261 | 263.1 | 3.0 | 4.8 | 84 | 103 | 48 | 41 | 111 | 10 | 29 | 63 | 3.0 |

[c] one replication only

Table 2 (Continued)

| Mo. Acc. No. | Yield Kg/ha | Plant type | Leaf size | Days to flower | Days to ripe | Hgt. cm. | Branch length cm. | Pods per plant | Seeds per pod | 100 seed wt. gm. | Virus score | Mildew score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M263 | 452.1 | 2.7 | 4.1 | 73 | 93 | 63 | 55 | 90 | 9 | 33 | 65 | 3.0 |
| M264 | 410.6 | 2.0 | 3.9 | 71 | 92 | 68 | 58 | 115 | 10 | 48 | 63 | 3.0 |
| M266 | 655.4 | 2.7 | 5.3 | 68 | 90 | 64 | 57 | 119 | 10 | 33 | 63 | 3.3 |
| M268 | 105.2 | 3.0 | 3.7 | 101 | | 44 | 46 | | | | 68 | 3.7 |
| M271 | 1200.7 | 2.7 | 5.6 | 47 | 72 | 53 | 48 | 134 | 11 | 38 | 33 | 4.7 |
| M274 | 503.5 | 3.0 | 5.0 | 70 | 93 | 56 | 55 | 173 | 12 | 37 | 68 | 3.5 |
| M277 | 245.6 | 5.0 | 5.7 | 65 | 85 | 64 | 52 | 67 | 9 | 41 | 57 | 3.0 |
| M280 | 619.5 | 2.0 | 4.3 | 69 | 90 | 61 | 56 | 79 | 10 | 29 | 65 | 3.3 |
| M281 | 605.9 | 2.0 | 4.5 | 71 | 91 | 73 | 62 | 116 | 10 | 37 | 60 | 3.7 |
| M290 | 515.1 | 4.0 | 5.7 | 50 | 73 | 62 | 46 | 63 | 9 | 65 | 47 | 4.0 |
| M291 | 689.7 | 2.7 | 4.3 | 74 | 93 | 61 | 54 | 114 | 9 | 37 | 68 | 3.3 |
| M293 | 995.0 | 2.7 | 6.5 | 62 | 83 | 69 | 60 | 186 | 11 | 32 | 12 | 4.0 |
| M297 | 475.2 | 3.7 | 6.7 | 40 | 56 | 44 | 39 | 85 | 11 | 41 | 52 | 4.3 |
| M298 | 295.0 | 3.0 | 5.4 | 41 | 59 | 30 | 23 | 54 | 10 | 31 | 13 | 4.7 |
| M299 | 602.8 | 3.0 | 5.2 | 42 | 59 | 44 | 33 | 95 | 11 | 29 | 15 | 5.0 |
| M300 | 1529.2 | 4.0 | 6.1 | 56 | 79 | 67 | 55 | 127 | 12 | 50 | 13 | 4.0 |
| M304 | 852.3 | 4.0 | 6.4 | 49 | 71 | 63 | 53 | 80 | 13 | 62 | 27 | 3.7 |
| M305 | 667.3 | 3.3 | 5.3 | 58 | 81 | 50 | 41 | 118 | 10 | 31 | 40 | 5.0 |
| M306 | 1148.1 | 4.0 | 5.6 | 48 | 70 | 63 | 51 | 155 | 12 | 37 | 32 | 4.7 |
| M307 | 468.0 | 3.0 | 5.0 | 69 | 90 | 54 | 47 | 113 | 10 | 35 | 32 | 4.0 |
| M308 | 698.4 | 4.0 | 5.5 | 64 | 87 | 63 | 57 | 107 | 11 | 39 | 35 | 4.0 |
| M310 | 1581.8 | 1.0 | 5.8 | 56 | 77 | 63 | 62 | 146 | 12 | 43 | 3 | 4.0 |
| M311 | 412.2 | 3.3 | 5.7 | 52 | 74 | 54 | 50 | 49 | 10 | 35 | 62 | 4.3 |
| M312 | 1374.5 | 4.0 | 6.2 | 54 | 78 | 67 | 56 | 116 | 13 | 54 | 27 | 3.7 |
| M317 | 1494.1 | 4.0 | 6.9 | 52 | 77 | 69 | 58 | 82 | 14 | 64 | 18 | 3.7 |
| M318 | 696.0 | 4.3 | 6.2 | 57 | 79 | 65 | 53 | 88 | 12 | 58 | 33 | 3.3 |
| M319 | 57.4 | 4.7 | 6.0 | 119 | | 61 | 52 | | | | 53 | 2.0 |
| M323 | 448.1 | 4.0 | 6.8 | 64 | 87 | 63 | 51 | 174 | 10 | 55 | 30 | 2.7 |
| M326 | 229.6 | 3.0 | 3.6 | 80 | 104 | 53 | 43 | 59 | 8 | 37 | 65 | 2.3 |
| M328 | 251.9 | 2.3 | 3.7 | 78 | 102 | 60 | 56 | 97 | 5 | 38 | 67 | 3.0 |
| M329 | 1031.7 | 4.0 | 6.7 | 50 | 72 | 65 | 56 | 99 | 14 | 63 | 28 | 3.7 |
| M330[a] | 1339.5 | 2.0 | 7.1 | 64 | 84 | 55 | 64 | 214 | 11 | 67 | 7 | 2.0 |
| M331[a] | 44.6 | 3.0 | 4.2 | 75 | 94 | 47 | 38 | 52 | 10 | 25 | 63 | 3.0 |
| M333[a] | 1690.3 | 3.0 | 6.8 | 48 | 70 | 68 | 62 | 99 | 11 | 55 | 22 | 4.0 |
| M334[a] | 219.3 | 5.0 | 5.7 | 57 | 81 | 78 | 60 | 56 | 8 | 58 | 60 | 4.0 |
| M335[a] | 12.0 | 5.0 | 5.3 | 103 | | 63 | 58 | 4 | 0 | 33 | 53 | 2.3 |
| M337[ac] | 971.1 | 4.0 | 5.7 | 46 | 69 | 48 | 49 | 87 | 11 | 45 | 25 | 4.0 |
| M338[ab] | 1000.6 | 4.0 | 6.8 | 50 | 72 | 73 | 52 | 87 | 12 | 45 | 30 | 4.0 |
| M339[ab] | 590.8 | 2.5 | 6.0 | 61 | 82 | 41 | 47 | 108 | 12 | 43 | 3 | 4.0 |
| M340[ac] | 990.2 | 4.0 | 6.5 | 53 | 78 | 55 | 60 | 117 | 13 | 55 | 20 | 4.0 |
| M341[ab] | 827.6 | 3.5 | 5.0 | 66 | 87 | 68 | 44 | 89 | 12 | 37 | 23 | 2.5 |
| M342[ab] | 110.0 | 3.5 | 4.2 | 68 | 91 | 35 | 24 | 71 | 10 | 45 | 45 | 2.5 |
| M343[ab] | 684.1 | 4.0 | 6.4 | 58 | 80 | 59 | 46 | 140 | 12 | 47 | 50 | 4.0 |
| M344[ab] | 629.1 | 4.0 | 6.0 | 46 | 72 | 66 | 47 | 111 | 9 | 53 | 35 | 5.0 |
| M345[ac] | 315.7 | 4.0 | 5.7 | 55 | 75 | 45 | 24 | 134 | 11 | 45 | 50 | 3.0 |

[a] new in 1971

[b] two replications only

[c] one replication only

Table 2 (Continued)

| No. Acc. No. | Yield Kg/ha | Plant type | Leaf size | Days to flower | Days to ripe | Hgt. cm. | Branch length cm. | Pods per plant | Seeds per pod | seed wt. gm. | Virus score | Mildew score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M346[a] | 566.9 | 3.7 | 5.8 | 52 | 75 | 55 | 39 | 96 | 11 | 57 | 32 | 2.3 |
| M347[ab] | 1046.5 | 4.0 | 5.3 | 65 | 85 | 71 | 58 | 124 | 13 | 45 | 23 | 3.0 |
| M348[ab] | 755.8 | 2.5 | 6.0 | 58 | 80 | 41 | 46 | 92 | 12 | 69 | 13 | 2.5 |
| M349[ab] | 942.4 | 4.0 | 7.2 | 55 | 76 | 66 | 58 | 53 | 12 | 50 | 20 | 3.0 |
| M350[ab] | 1430.4 | 4.0 | 5.7 | 51 | 73 | 59 | 55 | 111 | 13 | 49 | 23 | 4.0 |
| M351[a] | 1280.5 | 3.3 | 5.8 | 54 | 75 | 58 | 46 | 124 | 12 | 53 | 15 | 2.7 |
| M352[ab] | 934.0 | 4.0 | 5.5 | 49 | 72 | 53 | 34 | 107 | 11 | 42 | 30 | 3.0 |
| M353[ac] | 291.8 | 4.0 | 6.8 | 61 | 82 | 72 | 55 | 68 | 9 | 40 | 25 | 4.0 |
| M354[ac] | 444.9 | 4.0 | 6.0 | 52 | 75 | 56 | 54 | 107 | 10 | 45 | 20 | 4.0 |
| M355[ab] | 1182.8 | 4.0 | 6.4 | 46 | 71 | 54 | 46 | 95 | 12 | 44 | 18 | 3.5 |
| M356[ac] | 119.6 | 4.0 | 5.7 | 62 | 84 | 38 | 30 | 57 | 9 | 45 | 30 | 4.0 |
| M357[ac] | 1184.0 | 4.0 | 5.7 | 53 | 74 | 68 | 65 | 131 | 12 | 33 | 15 | 4.0 |
| M358[ac] | 1399.3 | 2.0 | 6.5 | 53 | 74 | 76 | 73 | 72 | 13 | 45 | 5 | 2.0 |
| M359[ab] | 1283.3 | 1.5 | 6.0 | 51 | 75 | 46 | 47 | 142 | 12 | 42 | 15 | 2.5 |
| M360[ab] | 540.6 | 4.0 | 5.8 | 63 | 84 | 51 | 38 | 39 | 10 | 45 | 5 | 3.0 |
| M361[ab] | 1038.1 | 4.0 | 5.6 | 55 | 77 | 54 | 49 | 122 | 12 | 40 | 23 | 3.0 |
| M362[ab] | 868.3 | 4.0 | 5.9 | 54 | 77 | 65 | 42 | 66 | 11 | 42 | 35 | 4.0 |
| M363[ac] | 664.9 | 4.0 | | 54 | 79 | 60 | 49 | 140 | 11 | 40 | 25 | 4.0 |
| M364[ab] | 1068.0 | 4.0 | 6.5 | 47 | 69 | 55 | 36 | 117 | 12 | 53 | 30 | 3.5 |
| M365[a] | 676.1 | 3.7 | 6.0 | 49 | 72 | 53 | 40 | 108 | 11 | 43 | 40 | 4.3 |
| M366[ac] | 14.4 | 3.0 | 5.0 | 88 | 108 | 26 | 14 | 113 | 10 | | 50 | 2.0 |
| M367[a] | 730.3 | 4.0 | 5.4 | 54 | 76 | 52 | 42 | 77 | 10 | 45 | 37 | 3.7 |
| M368[ab] | 653.0 | 3.5 | 5.4 | 57 | 78 | 59 | 41 | 167 | 12 | 47 | 18 | 3.0 |
| M369[ac] | 511.9 | 4.0 | 5.2 | 69 | 89 | 44 | 35 | 152 | 11 | 43 | 20 | 3.0 |
| M370[a] | 1452.7 | 2.0 | 5.9 | 59 | 81 | 75 | 69 | 133 | 11 | 35 | 8 | 2.3 |
| Range | 12 to 2548 | 1.0 to 4.7 | 2.8 to 7.5 | 40 to 119 | 56 to 120 | 24 to 82 | 13 to 76 | 4 to 235 | 5 to 14 | 24 to 75 | 0 to 72 | 1.7 to 5.0 |
| Mean | 924.4 | 3.2 | 5.7 | 58.5 | 80.1 | 58.2 | 50.5 | 115.2 | 10.7 | 45.1 | 34.1 | 3.6 |
| S. E. | 635.7 | | | 11.8 | 10.4 | 14.4 | 14.7 | 61.9 | 1.8 | 12.9 | 0.8 | 0.8 |
| C.V. | 69% | | | 20% | 13% | 25% | 29% | 54% | 17% | 29% | 62% | 23% |

[a] new in 1971

[b] two replications only

[c] one replication only

Table 3

Protein and Lysine Content of Mungbean Samples

| Mo. Acc. No. | Protein % | Lysine as % of protein | Mo. Acc. No. | Protein % | Lysine as % of protein |
|---|---|---|---|---|---|
| M2 | 27.2 | 7.06 | M122 | 26.1 | 7.66 |
| M4 | 25.9 | 6.64 | M127 | 27.3 | 7.00 |
| M12 | 27.8 | 7.52 | M128 | 27.4 | 7.92 |
| M13 | 27.4 | 7.70 | M130 | 28.6 | 6.47 |
| M14 | 26.6 | 7.26 | M131 | 27.3 | 7.40 |
| M15 | 25.0 | 7.84 | M132 | 25.6 | 7.23 |
| M20 | 28.3 | 6.82 | M135 | 26.2 | 7.25 |
| M25 | 31.2 | 6.60 | M136 | 25.8 | 7.33 |
| M27 | 26.0 | 6.92 | M137 | 25.8 | 7.36 |
| M28 | 27.3 | 6.85 | M138 | 24.6 | 6.87 |
| M29 | 28.5 | 6.67 | M139 | 25.4 | 7.48 |
| M36 | 29.3 | 5.94 | M140 | 25.4 | 6.22 |
| M38 | 28.3 | 6.64 | M142 | 25.4 | 7.44 |
| M40 | 27.9 | 6.77 | M144 | 26.3 | 7.22 |
| M61 | 27.9 | 6.42 | M146 | 26.2 | 7.63 |
| M67 | 26.1 | 7.74 | M147 | 27.8 | 7.45 |
| M69 | 25.2 | 8.13 | M148 | 26.0 | 7.46 |
| M75 | 27.0 | 7.70 | M150 | 27.6 | 7.79 |
| M79 | 27.3 | 7.91 | M151 | 26.6 | 7.44 |
| M81 | 23.2 | 8.45 | M153 | 28.2 | 7.27 |
| M90 | 26.6 | 6.47 | M155 | 26.7 | 7.57 |
| M95 | 25.3 | 7.75 | M156 | 28.0 | 7.64 |
| M97 | 26.9 | 6.77 | M157 | 27.1 | 7.45 |
| M98 | 26.6 | 7.18 | M164 | 28.6 | 6.82 |
| M99 | 25.9 | 7.41 | M170 | 26.4 | 7.27 |
| M101 | 24.5 | 7.10 | M174 | 25.9 | 6.83 |
| M103 | 26.1 | 7.59 | M175 | 26.6 | 6.84 |
| M104 | 27.3 | 7.66 | M183 | 27.3 | 7.44 |
| M105 | 26.7 | 7.19 | M194 | 27.1 | 6.75 |
| M107 | 27.1 | 7.79 | M195 | 26.9 | 6.84 |
| M108 | 26.4 | 7.65 | M203 | 26.1 | 7.01 |
| M109 | 26.1 | 7.74 | M206 | 26.6 | 7.29 |
| M110 | 27.3 | 7.58 | M210 | 27.3 | 6.23 |
| M111 | 24.2 | 7.44 | M214 | 24.9 | 7.07 |
| M112 | 25.6 | 7.23 | M221 | 27.1 | 6.86 |
| M117 | 25.0 | 7.68 | M227 | 28.8 | 6.77 |
| M118 | 25.4 | 7.01 | M232 | 26.0 | 6.92 |
| M119 | 28.1 | 7.76 | M233 | 25.7 | 7.35 |
| M120 | 25.7 | 7.63 | M234 | 28.8 | 7.33 |
| M121 | 25.1 | 7.97 | M235 | 25.3 | 6.60 |

Table 3 (Continued)

| No. Acc. No. | Protein % | Lysine as % of protein | No. Acc No. | Protein % | Lysine as % of protein |
|---|---|---|---|---|---|
| M237 | 28.1 | 7.44 | M337 | 26.5 | 7.70 |
| M238 | 26.4 | 6.82 | M338 | 24.9 | 5.90 |
| M241 | 27.4 | 6.20 | M339 | 25.0 | 7.32 |
| M248 | 26.5 | 7.74 | M340 | 28.1 | 6.90 |
| M254 | 26.7 | 7.00 | M341 | 25.2 | 7.86 |
| M277 | 26.4 | 7.08 | M343 | 26.9 | 7.32 |
| M298 | 27.7 | 7.76 | M344 | 27.8 | 7.45 |
| M299 | 26.7 | 6.89 | M346 | 23.9 | 7.62 |
| M300 | 26.1 | 7.74 | M347 | 27.4 | 7.12 |
| M304 | 26.8 | 6.79 | M348 | 25.4 | 6.85 |
| M306 | 27.9 | 7.49 | M349 | 22.5 | 7.69 |
| M307 | 26.6 | 6.84 | M350 | 26.6 | 7.07 |
| M310 | 23.4 | 7.44 | M352 | 26.1 | 7.62 |
| M311 | 25.0 | 8.00 | M354 | 27.6 | 7.50 |
| M312 | 26.9 | 7.51 | M355 | 23.9 | 7.15 |
| M317 | 26.1 | 7.20 | M357 | 27.6 | 7.50 |
| M318 | 26.6 | 7.67 | M358 | 22.8 | 7.72 |
| M323 | 28.6 | 7.17 | M360 | 27.2 | 7.65 |
| M330 | 26.5 | 6.94 | M361 | 22.1 | 7.69 |
| M331 | 26.5 | 7.81 | M362 | 25.8 | 7.75 |
| M333 | 26.4 | 7.01 | M364 | 26.4 | 7.58 |
| M334 | 27.7 | 7.36 | M367 | 27.1 | 7.90 |
| M335 | 26.5 | 7.74 | M370 | 26.4 | 7.01 |

| | | |
|---|---|---|
| Range, 126 strains | 22.1% to 31.2% | 5.90% to 8.45% |
| Mean 20 (10%) H.Y.S. | 26.0% | 7.03% |
| Mean 30 (15%) H.Y.S. | 26.0% | 7.16% |
| Mean 126 strains | 26.5% | 7.27% |

Table 4

Performance of 30 (15%) Highest Yielding Mungbean Strains at Columbia, Missouri, in 1971

| Acc. No. | Yield kg/ha | Plant type 1 - 5 | Leaf size 1 - 8 | Days to flower | Days to ripe | Ht. cm. | Branch length cm. | Pods per plant | Seeds per pod | 1,000 seed weight gm. | Virus score 0-100 | Mildew 1 - 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M90 | 2548 | 1.3 | 7.2 | 62 | 83 | 68 | 76 | 219 | 11 | 66 | 3 | 2.7 |
| M101 | 2150 | 1.0 | 7.1 | 52 | 74 | 52 | 47 | 113 | 12 | 75 | 2 | 2.3 |
| M81 | 2138 | 1.7 | 6.7 | 60 | 82 | 71 | 75 | 110 | 11 | 62 | 3 | 2.3 |
| M118 | 2128 | 1.7 | 7.0 | 64 | 87 | 70 | 73 | 108 | 11 | 65 | 0 | 2.3 |
| M233 | 2095 | 1.7 | 7.1 | 55 | 79 | 82 | 68 | 141 | 12 | 65 | 8 | 2.7 |
| M194 | 2042 | 1.7 | 7.2 | 60 | 81 | 81 | 76 | 217 | 11 | 61 | 3 | 3.0 |
| M238 | 2019 | 1.0 | 7.1 | 61 | 84 | 71 | 68 | 145 | 12 | 60 | 3 | 3.0 |
| M132 | 2012 | 2.0 | 6.5 | 54 | 76 | 74 | 58 | 128 | 14 | 50 | 12 | 4.0 |
| M235 | 2005 | 1.3 | 7.2 | 61 | 83 | 65 | 62 | 135 | 11 | 63 | 2 | 2.3 |
| M170 | 1992 | 1.3 | 7.0 | 54 | 77 | 52 | 58 | 226 | 12 | 50 | 10 | 3.7 |
| M138 | 1950 | 1.7 | 6.5 | 46 | 70 | 57 | 47 | 135 | 11 | 61 | 10 | 4.0 |
| M195 | 1949 | 1.7 | 7.2 | 63 | 85 | 62 | 72 | 171 | 11 | 62 | 8 | 2.3 |
| M153 | 1943 | 4.0 | 5.8 | 47 | 69 | 74 | 64 | 116 | 12 | 57 | 25 | 4.0 |
| M183 | 1926 | 1.7 | 7.2 | 62 | 81 | 69 | 66 | 91 | 10 | 67 | 12 | 2.3 |
| M4 | 1882 | 1.3 | 6.4 | 52 | 74 | 56 | 58 | 235 | 13 | 60 | 10 | 3.3 |
| M140 | 1864 | 3.3 | 6.2 | 43 | 66 | 45 | 39 | 180 | 11 | 53 | 17 | 3.7 |
| M232 | 1850 | 2.0 | 7.3 | 53 | 77 | 73 | 70 | 131 | 11 | 66 | 10 | 3.0 |
| M174 | 1808 | 1.3 | 7.5 | 62 | 84 | 78 | 69 | 188 | 11 | 63 | 2 | 2.3 |
| M206 | 1801 | 1.3 | 6.8 | 64 | 85 | 68 | 65 | 113 | 13 | 35 | 10 | 3.3 |
| M14 | 1792 | 2.0 | 7.0 | 63 | 83 | 76 | 66 | 90 | 11 | 70 | 8 | 2.7 |
| M136 | 1787 | 2.7 | 5.7 | 49 | 71 | 63 | 58 | 160 | 10 | 51 | 10 | 3.7 |
| M135 | 1765 | 3.3 | 6.1 | 44 | 69 | 49 | 49 | 121 | 12 | 42 | 20 | 3.7 |
| M333 | 1690 | 3.0 | 6.8 | 48 | 70 | 68 | 62 | 99 | 11 | 55 | 22 | 4.0 |
| M146 | 1681 | 4.0 | 5.9 | 53 | 75 | 59 | 49 | 139 | 12 | 58 | 32 | 4.7 |
| M234 | 1674 | 3.3 | 5.9 | 52 | 77 | 70 | 56 | 139 | 11 | 43 | 17 | 3.7 |
| M121 | 1611 | 4.0 | 5.8 | 45 | 67 | 44 | 38 | 150 | 11 | 39 | 28 | 4.3 |
| M203 | 1611 | 1.3 | 7.1 | 57 | 79 | 81 | 75 | 133 | 12 | 63 | 10 | 2.3 |
| M156 | 1595 | 3.3 | 5.6 | 55 | 77 | 66 | 57 | 119 | 12 | 55 | 25 | 4.0 |
| M310 | 1582 | 1.0 | 5.8 | 56 | 77 | 63 | 62 | 146 | 12 | 43 | 3 | 4.0 |
| M117 | 1575 | 2.0 | 6.8 | 52 | 74 | 60 | 55 | 164 | 12 | 52 | 18 | 4.0 |
| Mean, 20 (10%) highest yielding strains: | | | | | | | | | | | | |
| | 1995 | 1.8 | 6.9 | 57 | 79 | 67 | 64 | 150 | 11.6 | 61 | 7.9 | 3.0 |
| Mean, 30 (15%) highest yielding strains: | | | | | | | | | | | | |
| | 1881 | 2.1 | 6.7 | 55 | 77 | 66 | 61 | 145 | 11.5 | 57 | 10.5 | 3.2 |
| Mean, 203 strains: | | | | | | | | | | | | |
| | 924 | 3.2 | 5.7 | 59 | 80 | 58 | 51 | 115 | 10.7 | 45 | 34.1 | 3.6 |