Original Research Article

Combining Ability Studies for Yield and Its Component Traits in Groundnut (Arachis hypogaea L.)

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Abstract

In the present investigation, three lines were crossed with six testers in L × T mating design to estimate the combining ability for yield and component traits in groundnut. Non-additive genetic variance played a preponderant role in the inheritance of majority of characters studied viz., primary branches, secondary branches, matured pods per plant, immature pods, kernel yield per plant, 100 kernel weight, shelling per cent, sound mature kernels, chlorophyll content, haulm yield per plant and oil content. Additive genetic variance was more for the plant height and pod yield. The line Dh-86 and tester AGL-635 were found to be good combiners and are considered as superior parents in the present study as they recorded high per se performance with positively significant gca effect. Among the 18 F1 s, crosses viz., Dh-86 × AGL-108, TMV-2 × AGL-168 and Dh-86 × AGL-635 were considered to be superior as they recorded positively significant sca effect for pod yield per plant.

Keywords
Genetic variance, Combining ability, Gene actions and Hybridization.

Introduction

Groundnut (Arachis hypogaea L.) is an important oilseed crop of the world. Groundnut kernel is a rich source of energy because of its high oil content (44-50 %) and protein content (25-33 %). It contains 18 per cent carbohydrates, and also rich in minerals (calcium, magnesium and iron) and vitamins (B1, B2 and Niacin).

In any breeding programme, the choice of parents is an important aspect for the success of the crop improvement programme. For improvement of any plant character through hybridization, it is necessary to understand the nature of gene action and genetic architecture of the donar parents for that particular character. The information on the combining ability status of the genotypes will give an indication as to how well they combine with a given genotype to produce potential and productive populations and also on the nature of gene action involved. This helps the breeder to decide upon the choice of parents for hybridization.

Keeping these points in view, an investigation was taken up in groundnut (Arachis hypogaea L.) involving a set of three female and six pollen parents crossed in a line × tester design, to study the gca and sca and also the
gene action determining the growth and yield traits.

**Materials and Methods**

The experimental material for the present study comprised 18 F₁'s involving three lines GPBD-4, TMV-2 and Dh-86 and six testers AGL-2389, AGL-635, AGL-108, AGL-168, AGL-289 and AGL-2255. The F₁s along with parents were sown in Randomized Complete Block Design (RCBD) with two replications with spacing of 30 × 10 cm.

Observations were recorded on five randomly selected plants from each F₁ and parents on thirteen quantitative traits viz., plant height (cm), number of primary branches per plant, number of secondary branches per plant, number of matured pods per plant, number of immature pods per plant, pod yield per plant (g), kernel yield per plant (g), shelling percentage (%), sound mature kernel percentage (%), test weight (g), haulm yield per plant (g), chlorophyll content (mg/l) and oil content were recorded as per standard procedures. The statistical analysis was done as per procedure given by Kempthorne (1957) for combining ability analysis using line × tester mating design.

**Results and Discussion**

Analysis of variance indicated the presence of significant differences among treatments for all the thirteen characters studied (Table 1). Parents Vs crosses differed significantly for all the characters except kernel yield and haulm yield per plant. For efficient selection, presence of variability among the genotypes for the trait of interest is a prerequisite. Analysis of variance for combining ability revealed that variance due to lines was highly significant for three traits viz., plant height, pod yield per plant and oil content whereas testers showed non-significant differences for all the traits studied. The variance due to lines × testers was highly significant for all the traits under study except kernel yield per plant.

It indicated significance difference of sca effects among the crosses. The analysis of gene action expressed the higher proportion of SCA than GCA for all the characters studied except plant height and pod yield per plant (Table 2), indicating the role of non-additive components of variance in the inheritance of these characters.

Hence improvement of these yield related traits could be accomplished by selection of crosses having high sca effects and advancing progenies to later filial generations. This experiment results proposing the preponderance of non-additive gene action for the characters studied have supporting evidences from the earlier workers viz., Savitramma et al., (2010) for number of pods per plant and 100 kernel weight, John et al., (2011) for chlorophyll content, Mohan et al., (2012) for sound mature kernel percent and Padmaja et al., (2015) for shelling percentage.

The important criterion of selection is the general combining ability (gca) of parents. The parents with good per se performance and significant gca effects are considered as good general combiners for deriving desirable transgressive segregants in self-pollinated crops. Among testers AGL-635 recorded significant gca effect in desirable direction for important traits like matured pods per plant, pod yield per plant, shelling per cent, sound mature kernel per cent and haulm yield per plant. The line Dh-86 recorded gca effect in desirable direction for pod yield per plant. Among the lines Dh-86 and among all the testers AGL-635 could be considered as best combiners with respect to gca effect (Table 3). Thus, it would be worthwhile to use above parents in breeding programme for exploiting additive gene effects.
### Table 1: Analysis of variance (ANOVA) for yield and yield contributing traits in parents and hybrids in groundnut (*Arachis hypogaea* L.)

| Source                  | d.f | Plant height (cm) | Primary branches per plant | Secondary branches per plant | Matured pods per plant | Immature pods per plant | Dry pod yield per plant (g) | Kernel yield per plant (g) | 100 Kernel weight (g) | Shellin g percentage (%) | Sound Mature Kernel Per cent | Chlorophyll content (mg/l) | Haulm yield per plant (g) | Oil content (%) |
|-------------------------|-----|-------------------|-----------------------------|-----------------------------|------------------------|--------------------------|----------------------------|---------------------------|---------------------|-----------------------------|-----------------------------|---------------------------|---------------------------|------------------|
| Replication             | 1   | 3.35              | 0.06                        | 0.04                        | 0.35                   | 0.29                     | 0.06                       | 28.74                     | 0.15                | 0.37                        | 1.84                        | 0.10                      | 0.12                      | 0.13            |
| Treatments              | 26  | 34.27             | 1.66                        | 0.36                        | 18.40                  | 0.78                     | 44.93                      | 18.99                     | 59.83               | 25.86                       | 20.19                      | 9.90                      | 9.59                      | 2.61            |
| Parents                 | 8   | 52.11             | 2.74                        | 0.47                        | 20.47                  | 0.48                     | 25.69                      | 25.45                     | 41.69               | 8.52                        | 10.75                      | 7.43                      | 4.47                      | 2.04            |
| Lines                   | 2   | 112.18            | 2.94                        | 0.32                        | 28.84                  | 0.68                     | 60.60                      | 48.86                     | 81.09               | 5.158                       | 7.17                       | 12.21                     | 6.96                      | 0.95            |
| Testers                 | 5   | 27.85             | 1.72                        | 0.57                        | 20.82                  | 0.46                     | 9.512                      | 11.09                     | 26.40               | 11.47                       | 13.36                      | 6.90                      | 4.17                      | 2.88            |
| Lines Vs testers        | 1   | 53.29""           | 7.47""                      | 0.28                        | 1.96""                 | 0.13                     | 36.80""                    | 50.40""                   | 39.31""             | 0.51                        | 4.85                       | 0.49                      | 1.00                      | 0.03            |
| Crosses                 | 17  | 11.86'            | 1.02'                       | 0.31'                       | 15.10'                 | 0.91'                    | 44.17'                     | 17.07                     | 61.77'              | 30.12'                      | 20.55'                     | 11.22'                    | 12.55'                    | 2.85'           |
| Parents Vs. Crosses     | 1   | 272.58            | 3.92'                       | 0.37                        | 58.08'                 | 0.92                     | 211.67'                    | 0.09                      | 171.91             | 92.25'                      | 89.58'                     | 7.41'                      | 0.26                      | 3.02            |
| Error                   | 26  | 0.52              | 0.13                        | 0.08                        | 1.78                   | 0.13                     | 1.83                       | 0.66                      | 0.90                | 1.37                        | 0.64                       | 0.29                      | 0.19                      | -               |

Note: - Significant at 5%, "" - Significant at 1%

### Table 2: Analysis of variance (ANOVA) for combining ability for different traits in groundnut (*Arachis hypogaea* L.)

| Source          | d.f | Plant height (cm) | Primary branches per plant | Secondary branches per plant | Matured pods per plant | Immature pods per plant | Dry pod yield per plant (g) | Kernel yield per plant (g) | 100 Kernel weight (g) | Shelling percentage (%) | Sound Mature Kernel Per cent | Chlorophyll content (mg/l) | Haulm yield per plant (g) | Oil content (%) |
|-----------------|-----|-------------------|-----------------------------|-----------------------------|------------------------|--------------------------|----------------------------|---------------------------|---------------------|-----------------------------|-----------------------------|---------------------------|---------------------------|------------------|
| Replication     | 1   | 3.39              | 0.01                        | 0.04                        | 0.11                   | 0.11                     | 0.04                       | 25.00                     | 0.24                | 0.18                        | 1.78                        | 0.01                      | 0.65                      | 0.09            |
| Crosses         | 17  | 11.86'            | 1.02'                       | 0.31'                       | 15.10''                | 0.91''                   | 44.17''                    | 17.07                     | 61.77''             | 30.12''                      | 20.55''                     | 11.22''                   | 12.55''                    | 2.85''          |
| Lines           | 2   | 47.56'"           | 0.70                        | 0.10                        | 1.00                   | 1.33                     | 235.74'                    | 19.84                     | 38.81               | 11.30                       | 8.71                        | 18.30                     | 9.70'                      | -               |
| Testers         | 5   | 9.38              | 0.81                        | 0.22                        | 17.71                  | 0.84                     | 19.26                      | 19.09                     | 59.86               | 9.63                        | 20.73                      | 14.16                     | 9.81                      | 2.26            |
| Lines x testers | 10  | 5.97''           | 1.19''                      | 0.39''                      | 16.61''                | 0.86''                   | 18.31''                    | 15.51                     | 74.78''             | 38.62''                      | 22.31''                     | 10.24''                   | 12.77''                    | 1.78''          |
| Error           | 17  | 0.62              | 0.17                        | 0.10                        | 0.23                   | 0.15                     | 0.86                       | 14.37                     | 0.88                | 1.20                        | 1.29                        | 0.38                      | 0.34                      | 0.15            |
| s² GCA          | 3.0946 | 0.0645            | 0.0068                      | 1.0135                     | 0.1035                 | 14.0708                  | 0.9351                     | 3.3125                    | 2.5582              | 1.6359                       | 1.2282                     | 1.5238                    | 0.6486                    | -               |
| s² SCA          | 2.6737 | 0.5053            | 0.1479                      | 8.1918                     | 0.3538                 | 8.7263                   | 2.2293                     | 36.9492                   | 18.7111             | 10.5111                       | 4.9314                     | 6.2158                    | 0.8184                    | -               |
| s² GCA/ var SCA | 1.15 | 0.12              | 0.04                        | 0.12                        | 0.29                   | 1.61                     | 0.41                       | 0.08                      | 0.13                | 0.15                        | 0.24                        | 0.24                      | 0.79                      | -               |

Note: - Significant at 5%, "" - Significant at 1%
Table 3 Estimation of general combining ability effects of lines and testers for different traits in groundnut (*Arachis hypogaea* L.)

| Sl. No. | Parents   | Plant height (cm) | Primary branches per plant | Secondary branches per plant | Matured pods per plant | Immature pods per plant | Dry pod yield per plant (g) | Kernel yield per plant (g) | 100 Kernel weight (g) | Shelling percentage (%) | Sound Matur e Kernel Percent | Chlorophyll content (mg/l) | Haulm yield per plant (g) | Oil content (%) |
|---------|-----------|-------------------|-----------------------------|-----------------------------|------------------------|-------------------------|-----------------------------|---------------------------|----------------------|--------------------------|----------------------------|-----------------------------|---------------------------|-----------------|
| Lines   |           |                   |                             |                             |                        |                        |                             |                          |                      |                          |                             |                             |                          |                 |
| 1       | GPBD 4    | -0.51             | 0.23                        | -0.08                       | 0.25                   | -0.08                   | -2.86                       | 1.39                      | 0.21                 | 1.51**                   | 0.44                       | -0.73**                    | 1.42**          | 0.94**         |
| 2       | Dh 86     | 2.19              | 0.006                       | -0.01                       | 0.06                   | -0.28                   | 5.10                        | -0.25                     | -0.41                | 0.47                     | 0.66                       | -0.20                     | -0.67**                    | -0.84           |
| 3       | TMV 2     | -1.68             | -0.24                       | 0.10                        | -0.31                  | 0.36                    | -2.24                       | -1.13                     | 0.19                 | -1.98**                  | -1.11**                    | 0.93                       | -0.74**                    | -0.09           |
| SE for  | lines     |                   |                             |                             |                        |                        |                             |                          |                      |                          |                             |                             |                          |                 |
| CD @ 5% | 0.22      | 0.12              | 0.09                        | 0.14                        | 0.11                   | 0.26                    | 0.95                        | 0.27                      | 0.31                 | 0.32                     | 0.17                       | 0.16                       | 0.11                       |                 |
| CD @ 1% | 0.66      | 0.35              | 0.26                        | 0.40                        | 0.33                   | 0.77                    | 2.78                        | 0.78                      | 0.91                 | 0.95                     | 0.52                       | 0.49                       | 0.32                       |                 |
| Testers |           |                   |                             |                             |                        |                        |                             |                          |                      |                          |                             |                             |                          |                 |
| 4       | AGL2255   | -0.56             | 0.07                        | -0.26                       | -1.26**                | 0.66**                  | -1.87                       | 1.37                      | 2.98**               | -1.63**                  | -2.59**                    | -2.38**                    | 0.18                       | 0.33            |
| 5       | AGL289    | 1.76              | -0.29                       | 0.00                        | 0.33                   | -0.33                   | -1.21**                     | 0.14                      | -3.63**              | 0.17                     | 2.07**                    | 0.31                       | 1.82**                    | -0.19           |
| 6       | AGL168    | -0.77             | 0.30                        | 0.00                        | -1.30**                | 0.26                    | -1.61**                     | 1.47                      | 2.51**               | 1.29**                   | -1.88**                    | -1.12**                    | -0.98**                    | 0.81            |
| 7       | AGL108    | 1.20              | -0.39                       | -0.03                       | 0.83**                 | -0.16                   | 1.08**                      | 1.42                      | 1.79**               | -0.21                    | 0.46                       | 1.12**                    | -1.05**                    | 0.23            |
| 8       | AGL635    | -1.52**           | -0.22                       | 0.33                        | 2.90**                 | 0.20                    | 2.42                        | 1.27                      | -3.05**              | 1.52**                   | 1.51**                    | 0.19                      | 1.17**                    | -0.99**         |
| 9       | AGL2389   | -0.09             | 0.53**                      | -0.03                       | -1.50**                | -0.10                   | 1.18**                      | -2.85                     | 2.98**               | -1.14**                  | 0.42                      | 1.85**                    | -1.14**                    | -0.19           |
| SE for  | testers   |                   |                             |                             |                        |                        |                             |                          |                      |                          |                             |                             |                          |                 |
| CD @ 5% | 0.32      | 0.17              | 0.12                        | 0.19                        | 0.16                   | 0.37                    | 1.35                        | 0.38                      | 0.44                 | 0.46                     | 0.25                       | 0.24                       | 0.16                       |                 |
| CD @ 1% | 0.67      | 0.36              | 0.27                        | 0.41                        | 0.34                   | 0.80                    | 2.86                        | 0.80                      | 0.94                 | 0.97                     | 0.53                       | 0.50                       | 0.33                       |                 |

Note: ** - Significant at 5%, * - Significant at 1%

Table 4 Top three desirable crosses with their sca and gca effect of their parents with respect to 13 characters in groundnut

| Characters                  | Crosses                      | SCA Effect  | GCA Effect |
|-----------------------------|------------------------------|-------------|------------|
|                              |                              | Female      | Male       |
| Plant height (cm)            | GPBD-4 × AGL-108             | 2.51**      | Low        |
|                              | Dh-86 × AGL-635              | 1.95**      | High       |
|                              | Dh-86 × AGL-2389             | 1.50*       | High       |
| Number of primary branches per plant | Dh -86 × AGL-635                | 1.06**      | Low        |
|                              | GPBD-4 × AGL-2389            | 0.86*       | Low        |
|                              | Dh-86 × AGL-168              | 0.62        | Low        |
| Parameter                                      | GPBD-4 × AGL-2255 | Dh-86 × AGL-635 | TMV-2 × AGL-2389 | Dh-86 × AGL-108 | TMV-2 × AGL-168 | Dh-86 × AGL-635 | Dh-86 × AGL-108 | Dh-86 × AGL-168 | DM  |
|-----------------------------------------------|-------------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|
| Number of secondary branches per plant        | 0.61*             | 0.45            | 0.40             | Low             | Low             | Low             | Low             | Low             |     |
| Number of matured pods per plant              |                   |                 |                  |                 |                 |                 |                 |                 |     |
| GPBD-4 × AGL-2389                             | 3.91**            | 2.45**         | 2.10**           | Low             | Low             | Low             | Low             | Low             |     |
| TMV-2 × AGL-289                               |                   |                 |                  |                 |                 |                 |                 |                 |     |
| Dh-86 × AGL-635                               |                   |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Number of immature pods per plant             |                   |                 |                  |                 |                 |                 | Low             | Low             |     |
| TMV-2 × AGL-635                               | -1.10**           | -1.08**        | -0.38            | Low             | Low             | Low             | Low             | Low             |     |
| GPBD-4 × AGL-108                              |                   |                 |                  |                 |                 |                 |                 |                 |     |
| Dh-86 × AGL-635                               |                   |                 |                  | High            | High            | High            | High            | High            |     |
| Pod yield per plant (g)                       |                   |                 |                  |                 |                 |                 |                 |                 |     |
| Dh-86 × AGL-108                               | 4.79**            | 3.55            | 2.05             | High            | High            | High            | High            | High            |     |
| TMV-2 × AGL-168                               | 2.74**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Dh-86 × AGL-635                               | 2.66**            |                 |                  | High            | High            | High            | High            | High            |     |
| Kernel yield per plant (g)                    |                   |                 |                  |                 |                 |                 |                 |                 |     |
| TMV-2 × AGL-2255                              | 4.03              |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Dh-86 × AGL-108                               | 3.55              |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Dh-86 × AGL-168                               | 2.05              |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| 100 kernel weight (g)                         |                   |                 |                  |                 |                 |                 |                 |                 |     |
| Dh-86 × AGL-289                               | 7.52**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| GPBD-4 × AGL-635                              | 6.53**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Dh-86 × AGL-108                               | 4.91**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Shelling per cent                             |                   |                 |                  |                 |                 |                 |                 |                 |     |
| TMV-2 × AGL-2389                              | 7.15**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Dh-86 × AGL-108                               | 5.31**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| GPBD-4 × AGL-168                              | 3.46**            |                 |                  | High            | High            | High            | High            | High            |     |
| Sound mature kernel per cent                  |                   |                 |                  |                 |                 |                 |                 |                 |     |
| Dh-86 × AGL-168                               | 4.37**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| TMV-2 × AGL-635                               | 3.95**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| GPBD-4 × AGL-108                              | 3.63**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| Chlorophyll content (mg/l)                    |                   |                 |                  |                 |                 |                 |                 |                 |     |
| TMV-2 × AGL-289                               | 3.57**            |                 |                  | High            | Low             | Low             | Low             | Low             |     |
| GPBD-4 × AGL-2255                              | 2.50**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| TMV-2 × AGL-168                               | 2.20**            |                 |                  | High            | Low             | Low             | Low             | Low             |     |
| Haulm yield per plant (g)                     |                   |                 |                  |                 |                 |                 |                 |                 |     |
| GPBD-4 × AGL-289                              | 3.34**            |                 |                  | High            | High            | High            | High            | High            |     |
| Dh-86 × AGL-108                               | 2.73**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| GPBD-4 × AGL-635                              | 2.63**            |                 |                  | High            | High            | High            | High            | High            |     |
| Oil content (%)                               |                   |                 |                  |                 |                 |                 |                 |                 |     |
| Dh-86 × AGL-168                               | 1.36**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| TMV-2 × AGL-2255                              | 0.91**            |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
| TMV-2 × AGL-108                               | 0.73*             |                 |                  | Low             | Low             | Low             | Low             | Low             |     |
Among the 18 crosses evaluated, the crosses Dh-86 × AGL-635, Dh-86 × AGL-108 and TMV-2 × AGL-168 recorded significant sca effects for pod yield and its component traits in desirable direction (Table 4). For the majority of the traits, except plant height, pod yield, chlorophyll content and haulm yield per plant the low × low gca combination of parents were more observed to be the heterotic cross combinations, indicating the predominance of non-additive gene action. Similar findings were reported by Ganesan et al., (2010) and John et al., (2011) for oil content, Mohan et al., (2012) and Padmaja et al., (2015) for shelling percentage. For pod yield and haulm yield per plant high × high gca combination of parents were more observed indicating the predominance of additive gene action.

The results were in agreement with findings of Kavani et al., (2004), John et al., (2011) and Padmaja et al., (2015) for haulm yield per plant and Vasanthi et al., (2015) for pod yield per plant. For the traits plant height and chlorophyll content high × low gca combination of parents were more observed indicating the predominance of additive × non-additive type of gene action, which were in accordance of Mohan et al., (2012).

In conclusion, Based on gca, the parents Dh-86 and AGL-635 could be better choices for improvement of yield and its component traits through hybridization. The crosses Dh-86 x AGL-635, Dh-86 x AGL-108 and TMV-2 x AGL-168 which had highly significant sca effect for most of the yield contributing traits may be exploited for the development of hybrids since they also had high per se performance.

References

Ganesan, K. N., Paneerselvam, R., Manivannan, N., 2010, Identification of crosses and good combinors for developing new genotypes in groundnut (Arachis hypogaea L.). Electronic J. Pl. Breed., 1 (2): 167-172

John, K., Raghava Reddy, P., Hariprasad Reddy, P., Sudhakar, P. and Eswar Reddy, N. P., 2011, General and specific combining ability estimates of physiological traits for moisture stress tolerance in groundnut (Arachis hypogaea L.). Inter. J. Appl. Biol. Pharmaceut. Technol., 2 (4): 470-481.

Kavani, R. H., Golakia, P. R., Makne, V. G. and Mandaria, R. B., 2004, Genetic variation and trait association in Valencia groundnut (Arachis hypogaea L.). National symposium: Enhancing productivity of Groundnut for Sustaining Food and Nutritional security, October, 11-13: Pp. 27-28.

Kemphthorne, O., 1957, an introduction to Genetic Statististics, John Wiley and son Inc., New York, pp 545.

Mohan, K., Vasanthi, R. P., Hari Prasad Reddy and Bhaskar Reddy, 2012, Genetic variability studies for yield attributes and resistance to foliar diseases in groundnut. Inter. J. Appl. Biol. Pharmaceut. Technol., 390-394.

Padmaja, D., Eswari, K. B., Brahmeswara Rao, M.V., Shiva Prasad, G., 2015, Genetic variability studies in F2 population of Groundnut (Arachis hypogaea L.). Helix Vol., 2: 668-672.

Savitramma, D. L., Rekha, D. and Soumya, H. C., 2010, Combining ability studies for growth and yield related traits in groundnut (Arachis hypogaea L.). Electronic J. Pl. Breed., 1(4): 1010-1015.

Vasanthi, R. P., Suneetha, N. and Sudhakar, P., 2015, Genetic variability and correlation studies for morphological, yield and yield attributes in groundnut (Arachis hypogaea L.). J. Oilseeds Res., 38 (1): 9-15.
Yin, D. M., Zhang, X. Y. and Cui, D. Q., 2005, Studies on combining ability of major agronomic characters in peanut. *Chinese J. Oil Crop Sci.*, 27: 31-35.

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