# ASSESMENT OF BIOCHEMICAL ASSAY AND POST HARVEST QUALITIES OF CHICKPEA (*CICER ARIETINUM* L) SEED

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**Abstract:** The experiment was carried out for fifty one different chickpea genotypes collected from NBPGR, New Delhi and Pulses Improvement Project, MPKV, Rahuri and were grown in a randomized block design with two replication and three checks i.e. Vijay, Vishal, and Digvijay. Biochemical observations were recorded *viz.,* ash, calcium, carbohydrates, crude fiber, protein content, fat, niacin, phosphorous, riboflavin, starch, thiamine, vitamine-B6 and vitamin-A. The performance of the genotypes *viz.* IC-487323, IC-486938, IC-269111, IC-269004, IC-269015, IC-268947, and IC-270931 was found to be better for most of the quantitative characters, yield and yield contributing attributes. The chickpea genotype IC-490044 was found to be superior in respect of moisture content, germination percentage and vigour index and the genotype IC-270931, IC-268970 recorded significantly higher seedling dry weight and lower electrical conductivity at after harvested stage, respectively. Among the genotypes EC-490044 showed the highest ash content, calcium, fat content, starch content, vitamin-A and the genotype IC-327947 showed high value of carbohydrates, crude fibre and riboflavin, IC-327596 recorded highest protein content, IC-269128 showed highest niacin and thiamine and IC-487344 recorded highest vitamin-B6.

**Keywords:** Chickpea, biochemical assay, post harvest qualities.

**Introduction:** Chickpea (*Cicer arietinum* L.) is an important pulse crop grown and consumed all over the world, especially in the Afro-Asian countries. It is a good source of carbohydrates and protein, and protein quality is considered to be better than other pulses. Chickpea has significant amounts of all the essential amino acids except sulphur-containing amino acids, which can be complemented by adding cereals to the daily diet. Starch is the major storage carbohydrate followed by dietary fibre, oligosaccharides and simple sugars such as glucose and sucrose. Although lipids are present in low amounts, chickpea is rich in nutritionally important unsaturated fatty acids such as linoleic and oleic acids. β-Sitosterol, campesterol and stigmasterol are important sterols present in chickpea oil. Ca, Mg, P and, especially, K are also present in chickpea seeds. Chickpea is a good source of important vitamins such as riboflavin, niacin, thiamin, folate and the vitamin A precursor β-carotene.

The biochemical composition of crops varies with crop cultivars, soil and climatic conditions of the area, it is imperative to study the biochemical composition of different varieties of desi chickpea. Recently, Haq *et al.,* (2007) have performed studies on the physical characteristics, mineral composition and distribution patterns of various amino acids and fatty acid profile of seeds of some desi chickpea cultivars grown in Punjab, Pakistan. There is still a need to evaluate these characteristics so that, like other leguminous crops, chickpea may be helpful in solving the protein-calorie malnutrition problem all over the world. Therefore, analysis of the various biochemical parameters *i.e.,* moisture, ash, sugars, amino acids, total nitrogen, total protein, oil, ascorbic acid and crude fibre contents of the germplasm lines of chickpea is prime need to isolate desirable genotype for use in improvement of chickpea.

**Material and Methodology:** The present investigation entitled, "Evaluation of chickpea (*Cicer arietinum* L.) germplasm in relation to seed quality" was conducted at Sorghum Improvement Project, Department of Agricultural Botany and Seed Technology Research Unit, Mahatma Phule Krishi Vidyapeeth, Rahuri, during *rabi* season of 2012-13. The genetically pure seeds of fifty one genotypes of chickpea were obtained from NBPGR, New Delhi and Pulses Improvement Project, MPKV, Rahuri. The pure seeds were sown at 45 x 10 cm spacing at Sorghum Improvement Project, MPKV, Rahuri. Each genotype was sown separately in two replicates in separate plot.

**Result and conclusion:** The mean values of the genotypes for different biochemical characters studied are given in Table. The variation for ash was ranged between 1.50 and 3.17%. IC-485859 had minimum ash while EC-490044 produced maximum ash. The genotype EC-490044 had the significantly highest ash content followed by IC-327947, IC-486995 and IC-269044. Thirty two genotypes were with more ash than the mean (2.60%) performance. The variation for Calcium was ranged between 82.58 and 187.40 mg/100g. IC-485859 had minimum Calcium while EC-490044 had maximum Calcium content. It was followed by the genotypes IC-327947, IC-486995, IC-269044 and IC-269111. Thirty six genotypes were with more Calcium than the mean (155.34 mg/100g) performance. The variation for

Carbohydrates (%) was ranged between 37.28 and 63.99 %. IC-268946 had minimum Carbohydrates while IC-327947 produced maximum Carbohydrates. Twenty six genotypes were with more Carbohydrates than the mean (52.89%) performance. The variation for Crude fibre was ranged between 3.14 and 8.10%. The genotype IC-268985 had minimum Crude fibre while IC-327947 produced maximum Crude fibre. The significantly highest crude fibre was recorded by IC-327947 followed by IC-269128 and IC-424303. Seventeen genotypes were with more Crude fibre than the mean (4.62%) performance.

The variation for protein content (%) ranged between 17.68 to 25.31 per cent. The lowest protein content was recorded in case of IC-327656 while maximum in case of IC-327596. Among the genotype IC-327596 had significantly superior followed by IC-299246 and IC-424303. Twenty six genotypes were with more protein content than the mean (22.10%) performance. The variation for fat content (%) ranged between 0.09 to 1.64 per cent. The lowest fat content was recorded in case of IC-485859 while maximum in case of EC-490044. The significantly highest fat content was recorded by EC-490044 followed by IC-327947, IC-486995 and IC-487344. Thirty one genotypes were with more fat content than the mean (1.15%) performance. The variation for niacin (mg/100g) ranged from 0.66 to 2.48 mg/100g. The lowest niacin was recorded in case of IC-442831 while maximum in case of IC-269128. Twenty nine genotypes were with more niacin than the mean (1.87 mg/100g) performance. The variation for phosphorus (mg/100g) ranged from 348.04 to 456.43 mg/100g. The lowest phosphorus was recorded in case of IC-327947 while maximum in case of IC-485859. Thirty three genotypes were with more phosphorus than the mean (380.59 mg/100g) performance. The variation for riboflavin (mg/100g) ranged from 0.17 to 0.25 mg/100g. The lowest riboflavin was recorded in case of IC-485859 while maximum in case of IC-327947. More riboflavin than the mean (0.22 mg/100g) performance was observed in 27 genotypes. The variation for starch content ranged between 25.97 (IC-442831) and 61.37 % (EC-490044). Among the 51 genotypes, twenty six genotypes had more starch than the mean (47.29%) performance. The variation for thiamine (mg/100g) ranged between 0.29 to 0.64 mg/100g. The lowest thiamine was recorded in case of IC-442831 while maximum in case of IC-269128. Thirty three genotypes were with more thiamine than the mean (0.53 mg/100g) performance. The variation for Vitamin-B6 (pyridoxine) ranged between 0.22 and 0.86 mg/100g. The lowest Vitamin-B6 was recorded in case of IC-486938 while maximum in case of IC-487344. Among the genotypes studied, thirty one genotypes showed more thiamine than the mean (0.60 mg/100g) performance. The vitamin-A (Retinol) content among the genotypes ranged between 10.46 and 33.78 mg/100g. The lowest vitamin-A was recorded in case of IC-485859 while maximum in case of EC-490044. Among the genotype EC-490044 had significantly superior for this trait followed by IC-327947, IC-486995 and IC-269044. Thirty three genotypes were found to have more vitamin-A than the mean (26.55 mg/100g) performance.

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**Table 1. Mean performance of biochemical characters in 51 genotypes of chickpea**

| Sr. No. | Name of genotype | Ash (%) | Calcium (mg/100 g) | Carbohydrate (%) | Crude fiber (%) | Protein (%) | Fat (%) | Niacin (mg/100 g) | Phosphorus (mg/100g) | Riboflavin (mg/100g) | Starch (%) | Thiamine (mg/100g) | Vit-B6 (mg/ 100g) | Vit-A (mg/100 g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 1. | IC-269111 | 2.87 | 174.05 | 55.95 | 5.48 | 20.88 | 1.42 | 2.14 | 364.02 | 0.23 | 52.35 | 0.59 | 0.72 | 30.65 |
| 2. | IC-269002 | 2.67 | 161.70 | 49.78 | 4.18 | 19.93 | 1.24 | 1.94 | 372.18 | 0.23 | 47.23 | 0.59 | 0.73 | 27.90 |
| 3. | IC-269015 | 2.77 | 166.15 | 54.19 | 4.88 | 20.75 | 1.31 | 1.99 | 372.34 | 0.24 | 50.45 | 0.55 | 0.62 | 28.94 |
| 4. | IC-269092 | 2.46 | 146.80 | 47.92 | 3.46 | 21.56 | 1.02 | 1.63 | 382.14 | 0.22 | 42.87 | 0.50 | 0.56 | 24.63 |
| 5. | IC-269003 | 2.70 | 164.55 | 54.59 | 4.28 | 20.77 | 1.27 | 2.00 | 372.72 | 0.22 | 50.11 | 0.59 | 0.68 | 28.51 |
| 6. | IC-269021 | 2.56 | 153.95 | 45.58 | 4.09 | 21.52 | 1.13 | 1.81 | 382.99 | 0.22 | 45.71 | 0.53 | 0.64 | 26.21 |
| 7. | IC-269009 | 2.72 | 164.10 | 52.66 | 4.04 | 21.26 | 1.27 | 2.05 | 371.42 | 0.23 | 49.85 | 0.57 | 0.69 | 28.45 |
| 8. | IC-269113 | 2.60 | 155.45 | 43.43 | 4.07 | 22.89 | 1.15 | 1.82 | 382.49 | 0.23 | 46.28 | 0.51 | 0.65 | 26.56 |
| 9. | IC-269090 | 2.48 | 148.75 | 50.26 | 4.34 | 23.19 | 1.05 | 1.72 | 381.68 | 0.22 | 43.77 | 0.52 | 0.61 | 25.05 |
| 10. | IC-269093 | 2.66 | 160.75 | 49.65 | 4.29 | 21.81 | 1.22 | 1.79 | 373.14 | 0.22 | 46.72 | 0.52 | 0.69 | 27.69 |
| 11. | IC-268985 | 2.58 | 155.45 | 50.00 | 3.14 | 21.08 | 1.14 | 1.91 | 378.59 | 0.22 | 47.18 | 0.55 | 0.61 | 26.53 |
| 12. | IC-269120 | 2.54 | 153.30 | 53.89 | 3.62 | 21.34 | 1.11 | 1.66 | 370.08 | 0.22 | 43.29 | 0.55 | 0.62 | 26.04 |
| 13. | IC-268927 | 2.71 | 161.75 | 58.15 | 4.56 | 23.12 | 1.24 | 1.92 | 370.39 | 0.23 | 49.97 | 0.52 | 0.53 | 27.99 |
| 14. | IC-269147 | 2.68 | 161.25 | 57.61 | 3.58 | 20.60 | 1.23 | 1.80 | 375.45 | 0.23 | 47.47 | 0.55 | 0.63 | 27.82 |
| 15. | IC-269034 | 2.68 | 162.05 | 56.80 | 4.88 | 21.97 | 1.24 | 2.05 | 367.89 | 0.23 | 48.98 | 0.58 | 0.64 | 27.99 |
| 16. | IC-268947 | 2.79 | 170.15 | 61.39 | 4.87 | 23.41 | 1.36 | 2.10 | 369.14 | 0.22 | 51.38 | 0.61 | 0.69 | 29.76 |
| 17. | IC-268946 | 2.67 | 158.30 | 37.28 | 4.53 | 22.47 | 1.20 | 1.97 | 394.14 | 0.21 | 51.37 | 0.60 | 0.58 | 27.26 |
| 18. | IC-269056 | 2.60 | 155.30 | 49.04 | 4.02 | 22.38 | 1.15 | 1.94 | 380.07 | 0.23 | 47.99 | 0.53 | 0.58 | 26.53 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19. | IC-269045 | 2.63 | 158.70 | 54.17 | 3.86 | 21.31 | 1.19 | 1.97 | 377.64 | 0.22 | 48.48 | 0.57 | 0.60 | 27.24 |
| 20. | IC-268978 | 2.84 | 169.30 | 57.81 | 5.42 | 20.40 | 1.36 | 2.08 | 373.10 | 0.24 | 51.89 | 0.56 | 0.66 | 29.68 |
| 21. | IC-269128 | 2.89 | 173.65 | 60.26 | 7.56 | 21.51 | 1.42 | 2.48 | 370.09 | 0.25 | 52.66 | 0.64 | 0.80 | 30.62 |
| 22. | IC-268992 | 2.63 | 159.25 | 52.06 | 3.39 | 23.35 | 1.20 | 1.68 | 374.16 | 0.22 | 45.83 | 0.56 | 0.64 | 27.35 |
| 23. | IC-268930 | 2.66 | 157.30 | 52.71 | 4.85 | 23.48 | 1.19 | 2.05 | 379.49 | 0.24 | 50.70 | 0.50 | 0.52 | 27.02 |
| 24. | IC-268970 | 2.68 | 162.00 | 50.75 | 4.69 | 23.52 | 1.24 | 1.84 | 375.77 | 0.22 | 48.74 | 0.54 | 0.73 | 27.99 |
| 25. | IC-269044 | 2.91 | 174.70 | 59.04 | 5.93 | 22.76 | 1.44 | 2.27 | 362.31 | 0.24 | 55.63 | 0.56 | 0.62 | 30.86 |
| 26. | IC-269031 | 2.62 | 158.15 | 54.60 | 4.24 | 22.61 | 1.18 | 1.97 | 380.51 | 0.22 | 48.74 | 0.55 | 0.69 | 27.11 |
| 27. | IC-269004 | 2.47 | 145.15 | 50.98 | 3.38 | 23.65 | 1.01 | 1.76 | 375.67 | 0.23 | 44.06 | 0.49 | 0.39 | 24.34 |
| 28. | IC-487344 | 2.89 | 173.45 | 54.70 | 6.06 | 20.49 | 1.42 | 2.16 | 368.56 | 0.25 | 50.55 | 0.61 | 0.86 | 30.57 |
| 29. | IC-299779 | 2.69 | 159.15 | 61.04 | 3.96 | 22.75 | 1.21 | 1.80 | 362.70 | 0.24 | 47.38 | 0.52 | 0.49 | 27.45 |
| 30. | IC-327947 | 3.02 | 181.85 | 63.99 | 8.10 | 23.04 | 1.54 | 2.28 | 348.04 | 0.25 | 54.68 | 0.60 | 0.83 | 32.43 |
| 31. | IC-327596 | 2.57 | 154.20 | 55.02 | 3.81 | 25.31 | 1.13 | 1.85 | 378.12 | 0.22 | 48.76 | 0.51 | 0.46 | 26.26 |
| 32. | IC-113160 | 2.63 | 158.25 | 53.43 | 4.08 | 21.84 | 1.19 | 2.10 | 368.67 | 0.23 | 50.03 | 0.55 | 0.58 | 27.16 |
| 33. | IC-486995 | 2.91 | 174.70 | 62.43 | 6.65 | 23.34 | 1.44 | 2.03 | 362.65 | 0.24 | 51.71 | 0.58 | 0.68 | 30.86 |
| 34. | IC-485859 | 1.50 | 82.58 | 46.35 | 3.75 | 20.74 | 0.09 | 0.97 | 456.43 | 0.17 | 27.26 | 0.37 | 0.33 | 10.46 |
| 35. | IC-424303 | 2.87 | 172.15 | 62.24 | 7.44 | 24.78 | 1.40 | 2.12 | 351.53 | 0.24 | 51.87 | 0.57 | 0.73 | 30.29 |
| 36. | EC-555278 | 2.60 | 155.50 | 54.67 | 4.97 | 23.04 | 1.15 | 1.71 | 384.33 | 0.23 | 44.88 | 0.55 | 0.62 | 26.58 |
| 37. | IC-299118 | 2.48 | 146.80 | 46.94 | 0.61 | 24.27 | 1.03 | 1.83 | 393.99 | 0.19 | 47.59 | 0.60 | 0.52 | 24.68 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38. | IC-270931 | 2.59 | 153.75 | 47.45 | 3.98 | 22.67 | 1.13 | 1.81 | 376.70 | 0.23 | 46.06 | 0.51 | 0.50 | 26.23 |
| 39. | EC-490044 | 3.17 | 187.40 | 46.20 | 4.50 | 17.93 | 1.64 | 1.93 | 374.94 | 0.21 | 61.37 | 0.63 | 0.65 | 33.78 |
| 40. | IC-442831 | 1.58 | 84.75 | 45.14 | 4.25 | 22.60 | 0.14 | 0.66 | 451.00 | 0.18 | 25.97 | 0.29 | 0.27 | 11.03 |
| 41. | IC-350889 | 2.72 | 163.00 | 52.22 | 4.61 | 23.25 | 1.26 | 1.80 | 374.87 | 0.23 | 50.85 | 0.46 | 0.52 | 28.25 |
| 42. | IC-327656 | 1.86 | 101.83 | 45.41 | 3.98 | 17.68 | 0.39 | 1.18 | 441.12 | 0.20 | 32.82 | 0.39 | 0.28 | 14.85 |
| 43. | IC-486938 | 1.56 | 84.08 | 40.76 | 4.73 | 22.96 | 0.13 | 0.99 | 454.74 | 0.19 | 27.09 | 0.33 | 0.22 | 10.87 |
| 44. | IC-327890 | 2.59 | 155.30 | 55.27 | 5.84 | 21.96 | 1.15 | 1.83 | 380.38 | 0.23 | 45.35 | 0.54 | 0.67 | 26.51 |
| 45. | IC-299246 | 2.64 | 156.80 | 60.00 | 5.71 | 25.21 | 1.17 | 1.95 | 381.53 | 0.23 | 48.22 | 0.51 | 0.65 | 26.91 |
| 46. | IC-555401 | 2.50 | 149.80 | 47.91 | 3.75 | 21.28 | 1.06 | 1.92 | 390.16 | 0.22 | 44.52 | 0.57 | 0.63 | 25.28 |
| 47. | IC-487323 | 2.74 | 162.50 | 61.59 | 4.72 | 20.90 | 1.26 | 2.26 | 374.94 | 0.24 | 50.74 | 0.59 | 0.55 | 28.19 |
| 48. | IC-506753 | 2.61 | 157.80 | 51.11 | 4.37 | 20.43 | 1.18 | 1.86 | 378.73 | 0.22 | 47.67 | 0.55 | 0.67 | 27.04 |
| 49. | Vijay | 2.62 | 158.50 | 57.48 | 4.80 | 22.82 | 1.19 | 2.01 | 372.83 | 0.22 | 49.78 | 0.55 | 0.59 | 27.20 |
| 50. | Vishal | 2.64 | 158.90 | 53.01 | 4.68 | 22.38 | 1.20 | 2.14 | 375.47 | 0.23 | 49.25 | 0.56 | 0.61 | 27.31 |
| 51. | Digvijay | 2.62 | 157.60 | 52.64 | 4.14 | 21.91 | 1.18 | 1.93 | 378.28 | 0.22 | 47.92 | 0.54 | 0.59 | 27.03 |
| | **Mean** | **2.60** | **155.34** | **52.89** | **4.62** | **22.10** | **1.15** | **1.87** | **380.59** | **0.22** | **47.29** | **0.53** | **0.60** | **26.55** |
| | C.V. % | 3.94 | 3.89 | 9.69 | 18.85 | 5.29 | 7.85 | 8.00 | 2.54 | 6.32 | 5.21 | 5.25 | 13.12 | 5.11 |
| | S.E.+/- | 0.07 | 4.28 | 3.62 | 0.61 | 0.82 | 0.06 | 0.10 | 6.84 | 0.01 | 1.74 | 0.02 | 0.05 | 0.96 |
| | C.D.5% | 0.20 | 12.16 | 10.29 | 1.75 | 2.34 | 0.18 | 0.30 | 19.44 | 0.02 | 4.95 | 0.05 | 0.15 | 2.72 |
| | C.D.1% | 0.27 | 16.22 | 13.72 | 2.33 | 3.13 | 0.24 | 0.40 | 25.92 | 0.03 | 6.60 | 0.07 | 0.21 | 3.63 |