

Studies on Oil, Protein and Free Fatty Acid Content (Titrable Acidity) of Bunch and Spreading Varieties of Groundnut

by
A. GOPALSWAMY¹ and L. VEERANNAH

Groundnut is a rich source of protein and oil. The varietal and seasonal differences of the departmental strains TMV 1 (spreading) and TMV 2 (bunch) were sought to be examined in the light of their protein, oil and free fatty acid (titrable acidity) contents. In the metabolism of oil synthesis and protein, interesting aspects have been dealt with, such as formation of fats with concomitant disappearance of mannitol and reduction of protein in olive seed (Sahastrabudhe and Kale, 1933), balance of protein and oil in soyabean (Stark, 1924), association of genetic constitution on the synthesis of storage protein and oil in cotton seed as also nitrogen supply as an environmental factor (Eaton and Ergle, 1952; Tharp *et al.*, 1949). The protein-oil balance was examined in *sesamum* too (Kinnmann and Stark, 1954) with reference to variety and location of cultivation.

Materials and Methods: Seeds of TMV 1 and TMV 2 varieties of groundnut were utilised for the study. Thirty samples in each variety obtained from both irrigated and rainfed conditions characterising the seasons were analysed for oil, protein and free fatty acid (titrable acidity). The data of oil, protein and free fatty acids were studied for mutual correlation and regression (Table 1). The interaction between varieties and seasons with reference to oil, protein and free fatty acid content of kernels are furnished in Tables 2 (a), (b) and (c).

TABLE 1. *Correlation coefficient*

| Particulars | Correlation coefficient ($P = 0.01$) | Regression coefficient ($P = 0.01$) | Regression equation |
|-----------------------------|---|--|----------------------|
| Oil and protein | -0.3732** | -0.304** | $Y = 43.01 - 0.304x$ |
| Oil and free fatty acid | -0.0400 | ... | N. S. |
| Protein and free fatty acid | -0.1355 | ... | N. S. |

¹ Assistant in Chemistry and ² Assistant in Plant Physiology, Agricultural College and Research Institute, Coimbatore-3.

Received on 5-10-1967.

TABLE 2 (a) *Oil Interaction—Varieties X Seasons*

| Seasons/Variety | TMV 1 | TMV 2 | S. E. of mean | C. D. (P = 0.05) |
|-----------------|-------|-------|---------------|------------------|
| Rainfed | 51.29 | 49.95 | 0.566 | 1.5846 |
| Irrigation | 49.82 | 51.03 | | |

Conclusions :

| (a) Season | Varieties | (b) Varieties | Season |
|------------|--------------|---------------|--------------------|
| Rainfed | TMV 1, TMV 2 | TMV 1 | Rainfed, Irrigated |
| Irrigated | TMV 1, TMV 2 | TMV 2 | Rainfed, Irrigated |

TABLE 2 (b) *Protein Interaction—Varieties X Season*

| Season / Variety | TMV 1 | TMV 2 | S. E. of mean | C. D. (P = 0.05) |
|------------------|-------|-------|---------------|------------------|
| Rainfed | 32.39 | 31.54 | 0.299 | 0.8371 |
| Irrigated | 28.27 | 29.90 | | |

Conclusions :

| (a) Season | Variety | (b) Variety | Season |
|------------|--------------|-------------|--------------------|
| Rainfed | TMV 1, TMV 2 | TMV 1 | Rainfed, Irrigated |
| Irrigated | TMV 2, TMV 1 | TMV 2 | Rainfed, Irrigated |

TABLE 2 (c) *Free fatty acid (titrable acidity)—Comparison of Varieties*

| Variety | Mean |
|---------|------|
| TMV 1 | 6.40 |
| TMV 2 | 3.14 |
| S. E. | 0.12 |
| C. D. | 0.34 |

Conclusion : TMV 1, TMV 2

Results and Discussion: Oil content between varieties was not affected significantly under both irrigated and rainfed conditions. However, oil content varied with the two different seasons significantly (Table 2 a). It is

interesting that TMV 1 recorded higher oil content under rainfed conditions than TMV 2 while under irrigated conditions TMV 2 recorded higher oil content than TMV 1. Further intensive studies are obviously needed for seeking explanation for this phenomenon *viz.*, season rather than variety influencing oil content.

The protein content was higher in TMV 1 than in TMV 2 under rainfed conditions while under irrigated conditions, protein content was higher in TMV 2 than TMV 1. All the same, protein content was higher under rainfed conditions than under irrigated conditions in both varieties (Table 2 b).

The free fatty acid content of TMV 1 is higher than that of TMV 2 and the effect of season on free fatty acid (titrable acidity) formation was higher under irrigated conditions than rainfed. Both varieties behaved in a similar manner in this regard (Table 2 c).

The studies have shown that oil content as a characteristic constituent of variety was not sustained but the impact of season on the oil content has however been profound. The sequence of fat metabolism consequent on cessation of protein synthesis and the conditions obtaining at different seasons as also the difference in duration between varieties indicate that season rather than variety might very well influence the oil formation in groundnut. As for protein, the differences between TMV 1 and TMV 2 has been slight. However, rainfed conditions had effected more protein than the irrigated conditions and its consistency in both the varieties was noteworthy. This feature in protein content differs from that of oil content. The impact of season on free fatty acid content is also brought out as irrigated conditions favour rancidity in contrast to rainfed conditions.

Correlation coefficient among oil, protein and free fatty acid showed significant negative correlation between oil and protein while correlation coefficients between other pairs were negative but not significant.

Summary and Conclusion: Oil, protein and free fatty acid content (titrable acidity) were estimated in seeds of TMV 1 and TMV 2 groundnut varieties both under irrigated and rainfed conditions. Correlation coefficients were worked for pairs of factors of oil, protein and free fatty acid. Only oil and protein pair showed significant negative correlation. Seasonal influence was noticed in the oil content of the two varieties of groundnut.

Acknowledgements: The authors are thankful to Dr. John Durairaj, Professor of Soil Science, Sri S. Varadarajan, Agricultural Chemist and

Associate Professor of Soil Science and Dr. S. Gopalakrishnan, Plant Physiologist for their valuable suggestions and guidance in the preparation of this article.

REFERENCES

- EATON, F. M. and D. R. ERGLE 1952. Fibre properties and carbo-hydrates and Nitrogen levels of cotton plants as influenced by moisture and fruitfulness. *Plant Physiol.*, **27**: 547-62.
- KINNMANN, M. L. and S. M. STARK, Jr. 1954. Yield and chemical composition of *sesame*, *Sesamum indicum* L. as affected by variety and location grown. *J. Amer. Oil Chem. Soc.*, **31**: 104-8.
- SAHASTRABUDHE, D. L. and N. P. KALE. 1933. A biochemical study of the formation of the oil in niger seed. *Indian J. agric. Sci.*, **3**: 57-88.
- STARK, R. W. 1924. Environmental Factors affecting the Protein and Oil Content of Soybeans and Iodine number of Soybean oil. *J. Amer. Soc. Agron.*, **16**: 636-47.
- THARP, W. H., J. J. SKIMMER, R. P. BLEDSOE and H. B. BROWN 1949. *U. S. Dept. Agric. Tech. Bull.*, No. 974.

Fertilizer Requirements of Cotton in Parambikulam-Aliyar Project Areas

by

K. M. BALASUBRAMANIAM¹, N. JAYARAMAN² and
A. K. NAGARATHNAM³

Introduction: Fertilizers, in general, play a prominent role in stepping up crop yields. The benefits of irrigation, improved seed and improved management practices are fully realised only with the combination of application of optimum quantity of fertilizers that go to decide the availability of plant nutrients to the growing crop. In the *ayacut* areas wherever there are facilities for well irrigation, American cotton is being grown and acre yields upto 500 kg of *kapas* are obtained. The contemplated Parambikulam-Aliyar Project (PAP) when completed is likely to irrigate a total area of 2.4 lakhs acres lying in Pollachi, Palladam, Dharapuram and Udamalpet taluks of Coimbatore district. The availability of canal water in the newly developing project will give an impetus to include one of the commercially important crops like cotton in the crop rotation. Information

¹ Former Assistant Agronomist, ² Research Assistant and ³ Assistant Agronomist, Agricultural Research Station, Aliyarnagar.

Received on 27-12-1967.