

## REPORT OF THE

# SEED ANALYSIS

COMMITTEE

By L. L. MAYFIELD, CHAIRMAN

Shortly after the organization of the Seed Analysis Committee, for the past season, a letter was written to the committee members and a notice placed in the Oil and Fat Magazine asking for criticisms of the F. F. A. method and suggestions for its improvement. Several replies were received and from the information contained in them a plan of study was adopted.

The first step consisted of checking quite thoroughly the mechanics of the present method, since in the letters received almost every phase of the test was brought into question. This work brought out to the satisfaction of the committee that the preparatory step of the test were, with only slight changes, as satisfactory as could be devised. The committee wishes to emphasize the importance of thorough mixing of the sample and recommends that as large a sample as practical be used for the test, from 150 to 200 grams, where this is possible.

### Slight Increases

Some question was also raised about the effect and value of preheating on the sample. A thorough check showed this feature to be of advantage in hulling the seed and to have no influence on the acid value. The acid content of unheated seed and those treated for one-half hour, at 100° to 105° C., was uniformly the same. One hour treatment caused slight increases in the F. F. A. Heating for as long as three hours seemed to reduce the value about three-tenths and cause darkening of the oil. Since preheating is essential in getting complete separation of hulls in high moisture seed, it should be retained in the method.

The only part of the hulling operation in which care should be taken is to see that the huller is set just closely enough to cut all the seed. The finer the set past this point the more meats are entrained by the lint and the greater difficulty in separating the meats from the hull fragments.

The complete separation of meats from hulls is an essential point in obtaining concurring results. In some samples, in which a high percentage of hulls were left, widely varying results were obtained, while in others of a similar nature this was not so. At least we may say that a high hull content tends to make the test more erratic. In this regard the openings of the four-mesh screen, now used, are too large to allow an efficient separation. The committee recommends the use of a six-mesh screen. The size of the holes in this screen are such that while all of the meats sift through, only a very little of the lint and hull particles will pass.

By far the most important single operation of the whole test is the grinding and mixing of the meats. This was most forcibly brought out by a study of the

check seed, using the letter sent Mr. Harman, giving the individual routines on the F. F. A. test, as a guide. The most important point brought out by this study was that most laboratories off any considerable number of times always varied in the same direction. This could not be explained until, by studying their routine, it was invariably shown that those consistently high or low used different methods of grinding. A discussion here of all the various ways of grinding would be too lengthy and unnecessary. That all samples should be ground uniformly and that coarse grinding gives high results is common knowledge. However, the effect of even small changes in grinding might well be brought out. For instance, in many cases the only difference between the routine of those collaborators consistently high or low, was the use of the butter nut blade, or the finest toothed blade on the meat chopper. I believe there was no instance in which an operator using the butter and blade was consistently low, nor one using the toothed blade, high. The butter nut blade will uniformly give from two to five-tenths higher results on duplicate samples. Moreover, using the butter nut blade, regrinding of the sample will give successively higher results each time the sample is put through the chopper. This does not obtain with the toothed blade where constant results, higher by from one to two-tenths, are obtained by one regrinding. In view of the importance of this operation and the significance of even minor variations the committee recommends that the use of a meat chopper equipped with a specified blade, preferably the finest cutting toothed blade, be made mandatory for grinding meats. After grinding the sample should, of course, be thoroughly remixed and all lumps broken up before extraction.

### Complete Extraction Obtained

An effort was also made to determine if the method of extraction of the oil from the ground, mixed meats was material in affecting the result. A large number of samples were determined using the present method in comparison with hot or more correctly continuous extraction and also with one in which the meats were refluxed in ether and the oil filtered off. The results of these tests showed that the method of extraction in itself was not of practical importance in affecting the F. F. A. value, provided that extraction was complete in each case, that is within two or three per cent. The advantage of hot percolation lies in the ease with which complete extraction is obtained. However, with any except inept or inexcusably careless use the present method will give practically complete separation of

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method will give practically complete separation of the oil so that no change was believed necessary. There are two or three precautions which should be rigidly enforced in the present cold percolation process if it is to be successful. The amount of solvent used should be sufficient to extract all the oil, the rate of flow must be slow enough to allow time for the solvent to act, and care should be taken not to use too great an excess of meats. For this reason the committee recommends two 50 CC portions of ether with a wash of 25 CC, each portion to be added after the previous one has ceased dripping. The rate of flow should not exceed one at which the drops may be easily counted (150 per minute). It is also suggested that each laboratory use some small measure holding sixty to seventy grams of meats or some similar method of controlling this feature.

In the letters written to Mr. Harmon by the collaborators, there was quite a considerable variation shown, both in the time of drying of the oil on the steam bath and in the indicator used.

Tests show that there is no practical difference in the F. F. A. samples dried

one or two hours on an ordinarily hot steam bath. Darkening of the oil is the most disagreeable feature of continued heating. To avoid this and at the same time be certain that the oils are ether free, the committee recommends that F. F. A. oils be dried one and one-half hours on the steam bath. The use of the oven, for further drying, simply causes darkening with no apparent benefit and should, in our opinion, be discontinued.

It has also been repeatedly suggested that Methyl Blue should be used as indicator on this test. The greatest objection is that it is not as standard a product as phenolphthalein and we now use the latter in our refining test. Both are satisfactory on low acid oils. However, with dark or high acid oils Methyl Blue gives a markedly superior end point, both in sharpness of color change and ease of reading. Thus, as far as accuracy is concerned, the committee recommends the use of Methyl Blue. It also favors the continued use of the factor weight of 7.05 grams of oil and quarter normal caustic for titration.

The recommendation is also made that

no seed whose F. F. A. is over four be reported until a complete check determination has been made. The average, agreeing within check range, to be reported. This is necessary since duplicate extractions, even though they agree, are without great significance, when it is remembered that the most important operations of the test precede the extraction.

The Free Fatty Acid test, as it has been used for the past two years has now, in our opinion, been erroneous in any of its fundamentals. Its chief fault has been the latitude it allows in the details of its operation. It is a test whose usefulness and accuracy will be increased in direct proportion to the standardization of the details of its routine. It is for this reason that this report has been made in such detail. For this reason, also, the Seed Analysis Committee asks that the above recommendations be included in the rule for the coming season and that the membership of the society follow the rule, as published, to the letter, regardless of their personal ideas and routine, which, even the superior would almost certainly not give comparable results.