Memo To: Guy Jones  
   A. D. Stuart  
From: Foil McLaughlin, Chairman, All Practice Seed Production Committee  
Subject: Review, Present Status and Recommendations Concerning North Carolina Seed Improvement Program

In compliance with your request, I will try to review as well as point out the present status of the seed improvement program that has evolved since the Fall of 1963. I will also attempt to evaluate and propose some long range recommendations as you suggested.

Initial work was begun in late 1963 with a group of five county extension chairmen, certain extension specialists and others from the research staff and the Department of Agriculture with guidance from Federal Extension personnel. This group was referred to as the "Seed Program Committee" and was charged with the responsibility of evaluating our present seed program and establishing renewed emphasis for seed quality in North Carolina. A number of preliminary meetings were held as follows:


   At this meeting it was agreed to: (1) emphasize production of quality seed; (2) develop a system for measuring and identifying seed quality; (3) encourage all educational facilities to assist farmers in recognizing the importance of high quality seed and (4) evaluate these proposals at the county level and meet at a later date to receive any local suggestions.

2. December 16, 1963. Follow-up of the original Seed Program Committee meeting.

The county extension chairmen reported favorable reaction from their respective counties to the proposed renewed emphasis on a seed program and the committee generally agreed to have the commodity extension specialist, in cooperation with others, "develop a seed program for each major commodity". This involved Perry (peanuts), Toomey (cotton), Small (small grain and soybeans) and Haltiwanger (corn). As a result, a pilot seed program was developed for peanuts and cotton which involved county planter box surveys.

USE CERTIFIED SEED
3. May 7 - 8, 1964. Meeting to review status of the developing seed program with emphasis on a detailed discussion of the planned planter box surveys for cotton, peanuts and soybeans. The following counties were arranging to participate in this survey: Halifax - peanuts and cotton; Northampton - peanuts and cotton; Martin - peanuts; Perquimans - soybeans. It was generally agreed that the samples would be planted in each county where collected and that a detailed analysis of a portion of each sample would be made with a tetrazolium test, a regular germination test along with a germination of a retreated sample. Data would be collected by stand counts at designated intervals. Additional conclusions for this meeting were as follows: (1) Proposed that a seed committee be appointed to represent research, education and industry; (2) Suggested the development of a Short Course for producers and handlers of seed; (3) Asked for a review of the need for additional seed research; (4) Requested the appointed seed committee to provide information on all aspects of quality seed production and its use.

4. The Seed Program Committee visited the various plant-out samples in Halifax, Northampton and Martin during the summer.

5. October 20 - 21, 1964. This meeting consisted of a review of the data collected on the planter box survey samples. Certain questions were raised concerning the correlation between the laboratory test data and the stand counts made of the various lots of seed. It was agreed that data would be used only at the local level from these preliminary surveys but that surveys could be a useful tool in promoting seed quality in the various counties.

As a follow-up of these various meetings of the "Seed Program Committee", George Smith, Associate Director of Extension appointed an "All Practice Seed Production Committee". This committee was called to meet on November 12, 1964 and consisted of: eleven Agricultural Extension Specialists; three from county extension offices; one from vocational agricultural teaching; six from other areas of North Carolina State University; two from the N. C. Department of Agriculture and 19 representing farmers and agricultural business interests. Minutes of the meeting are attached.

1. Mr. Smith's charge to the All Practice Seed Production Committee was as follows:

a. "Outline a set of production practices that will result in the highest quality seed obtainable.

b. Determine those areas where additional information is needed in order that these may be passed on to the appropriate persons.

c. Re-examine the educational program on seed production and make suggestions for strengthening this program where desirable.

d. Make suggestions relative to the follow-up on this seed production program to assure maximum utilization of good seed by the farmers of this state".
2. All Practice Seed Production Committee recommendations:

The committee recognized the need for improved seed production practices as well as the need for re-emphasizing to farmers the importance of quality seed. The committee then developed suggestions for an outline of the best all practice seed production program for cotton, peanuts, soybeans and small grain. These suggestions were turned over to the appropriate commodity extension specialists to assemble in detail an all practice outline which would then be re-circulated to the All Practice Seed Production Committee. These outlines were to be proposed to the various commodity all practice committees who would be asked to be responsible for coordinating the seed production demonstrations.

The committee also recommended that various sub-committees be appointed by the chairman to follow through with detail plans for developing the overall seed program. Sub-committees appointed were as follows: (1) Seed Standards Sub-committee (Astor Perry, Chairman); (2) Seed Research Sub-committee (Emerson Collins, Chairman); (3) Educational Program Sub-committee (Glenn Toomey, Chairman); (4) Planter Box Survey Sub-committee (Marvin Godfrey, Chairman). (Refer to attached November 12 Minutes for Summary of Sub-committee duties).

The various sub-committees met as follows: (1) Seed Research Sub-committee met January 5, 1965 (See copy of Minutes). The Research Committee enumerated various areas where seed research was needed. These recommendations were followed up with a meeting of sub-committee chairman Collins and myself as overall chairman with Dr. Lovvorn. (2) Seed Standards Sub-committee met January 7, 1965 (See copy of Minutes). This committee recommended that the all practice seed demonstrations be followed on a pilot basis and suggested means for labeling such seed. (3) Educational Sub-committee met January 12, 1965 (See copy of Minutes). This committee recognized the need for a renewed educational program concerning seed quality and its use by the farmers. The group was enthusiastic over the possibilities of renewed emphasis on seed in North Carolina. (4) Planter Box Survey Sub-committee met January 12, 1965 (Copy of Minutes attached). The committee drew up detailed suggestions for conducting and making use of planter box surveys as related to the overall seed program in North Carolina and as a follow-up, E. R. Collins submitted a copy of the suggested survey outline and questionnaire concerning cotton, peanuts and soybeans to all county extension chairmen and specialists.

Additional follow-up was made as suggested by the All Practice Seed Production Committee (see memo dated February 12, 1965). Astor Perry and Glenn Toomey drew up seed programs for both peanuts and cotton and I understand that several programs were established in various counties. As you will note from the memo dated February 12, there were plans for another meeting of the All Practice Seed Production Committee to be held in the fall of 1965. As you know, this could not be done.

Summary - An All Practice Seed Committee has been established for purposes of establishing recommendations and guidelines for improving our seed program in North Carolina. Suggestions by the committee were made and sub-committees were appointed to make detailed studies of specific problem areas. Commodity extension specialists developed production practice outlines for cotton and peanuts and I understand several demonstrations, particularly on peanut seed production, were carried out in 1965. Certainly a number of problem areas exist
as far as research is concerned which is, of course, a long term proposition. Educational Sub-committee made a number of concrete suggestions which should be useful in evaluating our present educational seed program.

Recommendations - I believe that all agreed there was a need for re-emphasis of our seed program in North Carolina. Much progress has been made in most of the major production practices, however, there is still a large crop acreage in North Carolina planted with inferior seed. Surveys have pointed this up. Therefore, the major aim of any seed committee, seed specialist, Crop Improvement or seed associations should be as Mr. Pauling expressed, "To induce the planter of seed to appreciate two points; that is, (1) the serious disadvantage of planting seed of unknown quality and (2) the advantages of the opposite - that is, planting only seed known to be of high quality. The belief is that once these two ideas are firmly rooted, farmers will demand quality seed, seed growers can be induced to produce it, the idea of certified seed will come into its own. It is simply a matter of holding the focus on the problem". I am sure there are many approaches to this problem but I feel that the overall seed committee that has been appointed has served and can continue to serve a useful purpose. The committee possibly could be redesignated as "N. C. Seed Advisory Council" or some similar name which would encompass more of the responsibilities earlier assigned to the committee. I feel that certainly we need to have someone to coordinate the overall seed program for North Carolina and this should be done with added emphasis to the position of extension seed specialist. To act as leader in the seed program will take time and I feel that a large portion of a specialist's time should be set aside for seed work. We should not overlook the continued use of the sub-committees of the various problem areas. This involves large numbers of people and I think this is important. We need to be sure that any seed program developed has the full support of all segments and this can be done by the use of these various committees.

Conclusion - We need to:

1. Identify the audience to be worked with
   a. Which farmers are not using good seed
   b. Who is the key person in advising this group. (Can be FHA, banker, seedsman, SCS, Production Credit Association, ASCS, agricultural workers).

2. Develop information on seed
   a. Teaching aids for use at all levels in schools
   b. Visual aids and bulletins on seed quality
   c. Survey and/or test on quality seed levels
   d. Seed testing and labeling information

3. Involve people
   a. Extension seed specialist to coordinate seed program
   b. Make agricultural workers aware that something needs to be done on seed quality.
3. Involve People (Continued)

c. Have coordinated seed quality program at the local county level (involve all people associated with seed - county extension agents, vocational agricultural teachers, seedsmen, lending agencies - FHA, production credit, banks - , Soil Conservation Service, ASCS and seed producers).

We should:

1. Plan a program on seed at the county level
   a. Seed specialist to work with a few counties and develop a coordinated county by county program with leadership at the local level.
   b. All persons involved must be aware of the long time goals of the seed program.
   c. The program should be a "building type" and not a "one shot affair".
   d. Pick several counties for each of the major crops and develop a sound program.

2. Develop seed information - folder, bulletins, slides, teaching aids, etc. 
   Additional research on the use of quality seed must be secured.

3. Propose a method for county by county planter box surveys. (Summarize county results at state level and consider testing and planting out at state level. Assess status of seed quality and then re-evaluate X-no. of years later in the same counties where a good seed program is developed).

Copy to: P. H. Harvey

A. D. Worsham, Secretary
All Practice Seed Production Committee
MINUTES OF THE SEED RESEARCH SUB-COMMITTEE OF THE
ALL PRACTICE SEED PRODUCTION DEMONSTRATION

The committee meeting was held January 5 with the following members present: James Keel, George Watson, Howard Garriss, Ralph Sasser, Charles Raper, Henry Bowen, and E. R. Collins (chairman and secretary). Foil McLaughlin, Chairman of the All-Practice Seed Production Committee, outlined the background for the committee and sat with the committee during the morning session.

The following points were discussed relative to the following charge given the committee: "To focus attention on all areas of needed seed research and provide supporting information for establishing these needs. Special attention should be directed to each area as producing, processing, storing, evaluating, and planting seed."

PEANUTS

The economic importance of peanut seed is shown by the fact that North Carolina and Virginia used about 25 million pounds of seed peanuts that would be valued at $7,500,000 at 30 cents a pound. North Carolina uses about 15,000,000 pounds of seed valued at about $4,500,000.

1. **Shelling peanut seed was considered as one of the major problems.** Research is needed on methods of shelling peanuts with a minimum of damage.

   Shelling is still done by the use of beater bars in the same method used fifty years ago. These beater bars break up the hulls, doing considerable damage to the peanuts, and leaving some tap root ends that interfere with planting. This vigorous method of shelling damages many peanuts and the yields can be materially reduced.

2. **How to determine seed quality.** Research is needed to quickly evaluate a lot of peanuts for seed at the time of shelling.

   When peanuts are shelled for seed, a determination must be made at that time whether the lots should be kept for seed or sent to the trade. Little information is available on how to make a quick determination of the value of a lot of peanuts for seed.

3. **Research is needed relative to the advantage of sizing peanut seed and which sizes are best utilized for seed.**

   The trade assumes that a peanut riding a 15/64th screen is a sound mature kernel. Some seed will ride a 23/64th screen after shelling and can be two times as long as others. These sizes do not plant well and there is some indication that insects and disease attacks the larger peanut seeds first.
4. Research is needed on ways to break the dormancy of peanuts.

Dormancy in a peanut seed makes it difficult to evaluate the peanut seed by germination methods. Some work has been done with ethylene gas to break this dormancy. Additional work along this line would be desirable.

5. Research is needed on methods, chemicals, and time of seed treatment.

Seed treatment has been established as necessary with peanuts. There is some indication that this seed treatment results in ageing or deterioration of the seed.

6. Additional information is needed on the quality of seed under different fertility levels including molybdenum and boron. Soil fertility is known to play a part in the quality of peanut seed.

7. More information is needed relative to the effect of nematodes on peanut seed quality. Nematodes are common in peanut fields grown for seed.

8. Storage of peanut seed needs further study.

Methods of bulk and bag storage should be evaluated. Information is needed on the requirements for aeration of bulk stored peanuts, the advantages or disadvantages of different atmospheres with varying atmospheres of carbon dioxide and nitrogen contents; also, varying humidity, temperature, etc.

9. The moisture content of the peanut and shell should be evaluated for best shelling for peanuts.

Most peanuts are shelled at 7% to 7-1/2% moisture. Preliminary evidence would indicate that the hull should be brought back to about 10% moisture with the kernel having a temperature of 85° to 90° before shelling. These relationships need further study for best results.

10. Further research is needed relative to methods of distinguishing damage at harvest time to determine which peanuts to place in storage for seed. When peanuts are delivered to the buyer, they can be roasted at 200° for a short period. When the shell and skin are removed, bruised areas show up as white spots on the peanuts.

11. Research should be encouraged with systemics as they appear to offer an advantage as a fungicide for seed treatment.

12. Handling peanut seed in burlap bags remove much of the seed treatment from the seed. It has been observed that paper bags are superior to burlap bags. Further research is encouraged along this line to insure maintaining treatment on the seed until they are planted by the farmer.

13. Further suggestions relative to peanuts included the evaluation of preparing a ridge for peanuts, to be knocked off just before flat planting, in order to have better moisture conditions where the seed is placed. Also, that the College
establish contact with the new peanut research laboratory at Dawson, Georgia, as much of this information would be applicable to seed production.

14. Research on combine methods would be helpful. Present combining equipment causes excess damage to peanuts to be saved for seed. This requires hand stacking and picking for best peanut seed.

It was suggested in this connection that a long time program be developed that might mow off the peanut tops, dig the peanuts, dry the peanuts, pick, shell, and then store. This would permit evaluating peanuts after the entire operation has been completed and would make possible more concise storage conditions.

15. Research might develop hormones or other means of reestablishing a good root system on the damaged embryo.

The nature of the peanut seed results in severe damage to the root of the embryo when this root section is damaged. The yields from damaged peanut seed are materially decreased because of an inadequate root system.

CORN

Two and one-half million dollars worth of corn seed were required to plant the acreage in this state before the feed grain program was introduced. Corn shipped in to feed our present livestock does not make the same contribution to the economy of the state as corn produced in this state. From the standpoint of the state's economy, perhaps more emphasis should be placed on the importance of this corn being grown in this state.

The lack of an organization for feed grains such as the Cotton Promotion Association and the Peanut Growers Association was felt as one of the deterring factors towards developing the maximum progress in corn. It was felt that an annual get-together with industry for a discussion of the problems and their solutions would be helpful.

There was a feeling that a crash program over the next 2 to 5 years is needed to develop some outstanding corn varieties that will give the farmer two or three harvest dates to extend his harvest operation. It was felt that the present program may be too much self-centered, without enough sharing of ideas and coordination to bring about the greatest utilization of singles and double crosses for testing.

1. Including the official variety testing program as research, more information is needed on available hybrids relative to characteristics such as pickability and farmer preferred characteristics. A wider and more extensive testing program is needed.
2. General Comments.

It was brought out that farmers frequently can not get enough bags of the same size seed to plant their corn acreage. Also that corn from different companies vary in size and shape to the extent that the farmers experience difficulty in getting the right kind of planter plates to give uniform stands.

There appeared to be generally adequate information available for the proper growth, progressing, and merchandising of high quality corn seed. Research needs appear to be more in the area of improved germ plasm than in technical handling procedures.

**SMALL GRAIN**

1. Research is urgently needed on control methods for Yellow Dwarf. This disease stands out as a deterrent to both seed production and maximum use of small grain for the economy of the state.

The general attitude towards small grain appears to be comparable to that of cotton a few years ago. The handling of the government's feed grain program materially decrease the amount of wheat planted in North Carolina in 1964. The adoption of improved practices for the production of more economical yields would increase the present low demand for certified and high quality seed.

**SOYBEANS**

It would be desirable to enlarge the official variety test for soybeans as they have gained materially in importance to the economy of the state.

1. Research on best combining methods for seed would be helpful. Mechanical injury was indicated as one of the major problems in seed production. Some of this could be overcome by slowing down the combine, but additional information is needed.

**COTTON**

1. Further investigations are needed on better methods of seed treatment including safe methods of handling, and best treatment with electronics and systematics.

It is recognized that cotton seed must be treated. Although mercurials give a wide range of kill of disease organisms, the methods available to seed processors and growers is not generally satisfactory.

A look at the regional seed test would be desirable. The seed submitted to this regional test is generally not done by commercial seed treaters. The stand counts are taken at 6 weeks without following through to yield data. The information may not be too applicable to farm conditions.

It is estimated that present wet methods of seed treatment result in overdosing approximately 13% of the seed.
General Comments.- The need for improved sampling and testing techniques for better evaluating peanut seeds at different stages of production was referred to the appropriate committee.

The Food Machinery Company has made a survey relative to a satisfactory peanut sheller. They indicated that they felt a satisfactory peanut seed sheller could be developed to the cost of $25,000 to $35,000. They did not feel that the market would justify their expense of development. It was suggested that this approach be investigated and the project perhaps subsidized because of the importance of this type of equipment.

The extreme variation in size of peanuts developed for a diversified market, makes it difficult to obtain seeds of similar size for planting. This genetic variation might be further investigated in variety selection.
MEMORANDUM

TO : Dr. R. L. Lovvorn

FROM : E. R. Collins, In Charge, Extension Agronomy

SUBJECT : Research Needs Relative to Seed Production

March 1, 1965

May I express our appreciation for the opportunity to review the minutes of the seed research subcommittee meeting on the All-Practice Seed Production Demonstration with you.

Recognizing that there will always be a big backlog of needed research, it appears to me that some of the problems listed have more opportunity of making an immediate opportunity than others. These are listed as follows:-

1. Research on methods of shelling peanuts with a minimum damage would have an immediate effect. It also appeared from the discussion of the committee that some of the present knowledge could be easily incorporated to improve the situation.

2. Seed treatment on cotton appears to have many problems. If this could be worked out for cotton, it would also probably be applicable to some of the treatment problems discussed by the peanut group.

3. Better methods of evaluating peanuts for seed purposes before, during, and after processing. Although this was specifically emphasized by the committee for peanuts, methods developed would probably be adaptable to other crops.

4. Seed evaluation for field performance has continuously plagued our efforts in working with farmers. The tremendous strides have been made in developing conventional germination tests, cold tests, and tetrazolium tests have permitted much better evaluation of the potential quality of seed. Planter box surveys last year emphasized the fact that intermediate quality seed were difficult to evaluate by present methods. Proposals suggested include the field testing of large lots of seed to determine which lots have a wide variance from the indications of present tests. These lots of seed with known field performance under different conditions would then be available to test new methods for their effectiveness in evaluating actual field germination.

ERV/dv

cc: Dr. P. H. Harvey

Foil McLaughlin

Dr. Guy Jones
MEMORANDUM TO: Dr. R. L. Lovvorn

FROM: Paul H. Harvey

I am giving below my comments on Dr. Collins' memorandum of March 1 on research needs relative to seed production.

1. This research probably belongs in the area of Agricultural Engineering. However, cooperation with crop scientists is necessary to evaluate the mechanical effects on the seed proper.

2. This is primarily a plant pathology responsibility. This area of research has been worked on for many years and is still a continuing problem. A joint approach between Agricultural Engineering and Pathology may be needed since the distribution of the fungicide on the seed surface seems to be the main problem. The nature of the cotton seed is involved since it is a fuzzy coated seed which makes distribution of the chemical treatment difficult. Acid delinting has greatly improved this feature.

3. Dr. Moore has given a great deal of thought to this area of research and more work is justified. Perhaps some cooperative work with Botany on the actual anatomy and morphology of the seed would be a useful approach.

4. Seed evaluation for field performance is very difficult. It will continue to take effort on the part of a number of people to gain any new information here. I believe the committee is really calling for additional support and not any major change in our research approach. Ideally, we should never use anything but first class seed but this is not possible for the farmers. When they consider the economics, they are inclined to go to the less costly per unit seed. It may be difficult, if not impossible to come up with a laboratory test method which will truly evaluate field performance of intermediate quality seed under all environmental conditions. I personally believe that the cooperation between Mr. George Spain of the State Seed Laboratory and the group on campus working with some of the county agents will perhaps give us some real leads.