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EVALUATION OF HAGEEN DURRA NUMBER ONE HYBRID SORGHUM SEED PRODUCED BY TROPICAL SEED CO., INC. AND DEKALB-PFIZER OF ARGENTINA FOR SUDAN UNDER THE AGENCY OF INTERNATIONAL DEVELOPMENT, COMMODITY PROGRAMME

GRANT NUMBER 606B

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SUMMARY

A preliminary examination of Hageen Durra One (HD-1) seed produced by Tropical Seed Co., Inc. of Harlingen, Texas and shipped to Sudan under the United States Agency for International Development (USAID) grant contract 606B indicates the seed were immature when harvested. Scientific literature indicates that immature seed will not maintain their viability well in storage. This probably is the major cause of poor germination reported by the Seed Testing Laboratory at Sennar, and dated August 5, 1985. This report shows the germination of HD-1 seed from Tropical Seed Co., Inc. to be 7 to 9% for the three sublots 1-A, 1-B, and 1-C.

Samples from the above three sublots were taken November 26, 1986, and again tested at the laboratory at Sennar. On December 4, the tests were terminated after 8 days in the germination room. Only one (1) normal seedling was produced by the 1200 seeds planted. Another test conducted at the same time, on the same samples, in rolled germination towels and maintained at room temperature produced the same results. There was only one (1) normal seedling produced out of 1200 seed; 99.7% of the seed were dead.

Two samples of HD-1 seed produced by DeKalb Argentina were obtained from one shipping container at Port Sudan December 2, 1986. One sample was obtained by randomly sampling exposed bags in the container. The other sample was taken from one bag that was opened to examine the packaging of the seed. These samples were divided in half; one half of each sample was taken to Sennar for testing, and the other half was returned to Texas for testing. Germination was 74% and 73% for the composite and single bag samples, respectively.

There was no evidence of damage to the seed in the shipping container at Port Sudan. There was no trash or debris, and no evidence of insects,

rodents, or other predators, and no evidence of the seed bags being wet at any time. Thus, the seed appeared to be in good condition.

Examination of the seed storage warehouses at Sennar revealed a substantial concrete and brick structure with a concrete floor and a corrugated sheet metal roof. Windows covering the entire length of the warehouse on each side provided adequate ventilation.

An external examination of the seed storage warehouses at Wad Medani (Gezira Board Warehouses) was made December 4. The warehouses were being fumigated with Phostoxin at the time of the visit and there was no opportunity to make an inspection of the interior. The warehouses were brick, concrete, and corrugated sheet metal construction. Ventilation was provided along the ridge of the roofs. Also, it was reported that the doors all were opened two days each week to provide additional ventilation.

Some recommendations are made to attain optimum storage of seed in this area. Seams and cracks in floors should be caulked to reduce catchments for seed and trash, and harbors for insects. Seed should be stacked on pallets to keep them from coming in contact with concrete floors. Such contact can cause an increase in moisture content of seed which will lead to more rapid decline in seed viability. Lots of seed should be stored on pallets in rows with an aisle between rows to provide ventilation and access to each bag of seed to facilitate sampling and inventory control. In the case of the warehouse at Sennar, covers for the windows need to be provided to keep out rain. Seed should never be stacked adjacent to and/or in contact with fertilizer. Warehouses need to be examined on a routine basis for the presence of insects, rodents, and other pests, and they should be fumigated or sprayed for insects and control measures provided for other pests.

An inventory control system identifying seed by kind, variety, lot number, and quality measurements would provide an adequate means of accounting for USAID financed seed in Sudan. For seed coming from the U.S., this information is printed on tags sewn to each bag of seed, and kind, variety, and lot number are stamped in bold letters on each bag. The identifying information indicated should be kept in a card file (or other suitable inventory file) at central warehouses and at distribution points. This inventory file should show the quantity of seed on hand at each location, and where, to whom, and quantity of seed shipped. At the end point, the records should reveal quantity sold or distributed to each farmer. A complete accounting could then be provided to USAID at the end of the planting season. The report should show how much of each lot of seed of each crop and variety was planted, where it was planted and by whom. It would also reveal the amount of seed remaining (if any) to be carried over to the next year.

INTRODUCTION

At the request of the United States Agency for International Development (USAID) an investigation was conducted to determine condition and quality of seed of Hageen Durra One produced by Tropical Seed Co., Inc. of Harlingen, Texas and by DeKalb-Pfizer Genetics of Argentina.

The stated objectives of this investigation include:

1. To determine the quality and viability of HD-1 seed imported into Sudan under the USAID Commodity Import Program Grant, Number 606B, and to assess the cause for loss of viability if this is confirmed.
2. Seed storage facilities run by the Government of Sudan in Port Sudan, Sennar, and Wad Medani are to be examined to determine their adequacy for safe storage of seed, and recommendations are to be made to correct any inadequacies found, including proper treatment to control pests.
3. To make recommendations to achieve optimum conditions required for storage of hybrid sorghum seed to maintain viability of seed to the next planting season.
4. To recommend a system for accounting and control of USAID financed seed in Sudan to identify seed movements and ultimate distribution.

RESULTS OF SEED QUALITY EVALUATIONS

Documentation of Seed History

Objective No. 1: To determine the quality and viability of HD-1 seed imported into Sudan under the USAID Commodity Import Program Grant, Number 606B, and to assess the cause for loss of viability if this is confirmed.

An examination of documents pertaining to HD-1 seed produced by Tropical Seed Co., Inc. of Harlingen, Texas and shipped to Sudan revealed the following information. Referenced documents are contained in Appendix "A".

1. On August 6, 1985, the Embassy of the Democratic Republic of Sudan requested that Tropical Seed Co., Inc. submit an offer no later than August 12, 1985 for production of 800-1000 tons of seed of HD-1. The seed of this hybrid were to be delivered to Port Sudan no later than May 1 to 15, 1985.
2. Tropical Seed Co., Inc. submitted an offer to produce 200 tons of HD-1 to be produced in South Texas. The delivery schedule indicated shipment from Houston, Texas between March 15 and 31, 1986.
3. An "AGREEMENT" between Bob Hensz Farms and Tropical Seed Co., Inc. specified that all the acreage of HD-1 was to be planted by September 10, 1985.
4. A letter to Robert L. Hensz, President of Tropical Seed Co., Inc. from Kenneth Boatwright, Director, Seed Program, Texas Department of Agriculture advises that application for certification eligibility was approved January 27, 1986.
5. The seed of HD-1 from Tropical Seed Co., Inc. had been harvested, stored in a seed bin ("tank #3") and fumigated with Phostoxin

(Aluminum phosphide) on March 6, 1986. This material reportedly has no adverse effect on germination of seed (B-1410. Suggestions for Controlling Insects in Farm-Stored Grain. Texas Agricultural Extension Service. Texas A&M University System. Table 2. p. 14). A copy is included with this report.

6. A report from the Texas Department of Agriculture (TDA), Seed Laboratory, Giddings, Texas, and dated March 19, 1986 indicates that germination of seed of HD-1 from Tropical Seed Co., Inc. was 80%; the pure seed fraction was 99.86% and inert matter was 0.14%. There were no other crop seed or weed seed reported. The germination test was begun March 14 and terminated March 19. This allows only five days for completion of the test. A maximum of 10 days is permitted in the Association of Official Seed Analysts (AOSA) Rules for Testing Seeds, and a preliminary count is permitted at day number 4. However, in the opinion of the author, it is unusual that a test is completed and results reported in five days.

Almost all seedsmen label their seed as 80% germination, even if the laboratory report shows 100%. This provides a safety margin the seedsmen allow themselves. The referenced report shows that the seed germinated 80%, which indicates that the seed did not germinate any higher.

A seedsman can label his seed any way he chooses. He can guess at any of the values if he wants, and report these on the analysis tag. (In this case the analysis tag is the manila colored "Texas Tested Seed Label" sewn to each bag of seed). However, he usually uses test results from a reputable laboratory such as the TDA laboratory. The seedsman can and usually does allow a safety factor in purity test results the same as with germination percent.

7. In this test report, the "pure seed" fraction was 99.86% with only 0.14% inert matter. The analysis tag on the seed of HD-1 from Tropical Seed Co., shipped to Sudan shows 98.00% pure seed, 1.99% inert matter, and 0.01% other crop seed. Using the 99.86% (reported by TDA) and the 98.00% (reported on the analysis tag) for pure seed, and going to Table 6, p. 87 in the AOSA Rules for Testing Seeds, the result is that the two percentage figures are not within the limits of tolerance. This is not incorrect because the lower percentage is listed on the analysis tag. The seedsman did not claim the higher percentage. However, it suggests that the sample submitted to the TDA laboratory does not agree with the "sample" on which the analysis tag percentage is based. Stated another way the TDA laboratory did not find as much inert matter (0.14%) as reported on the tag (1.99%).

8. On the other hand, the results from the seed laboratory at Sennar, Sudan for pure seed (98.1% average of the three sublots, 1-A, 1-B, and 1-C) agree very well with the analysis tag (98.00%). Inert matter reported on the analysis tag was 1.99% compared to 1.80% average of samples analyzed at Sennar. These figures are well within tolerance. However, probes used to take samples of seed from bags usually crack some seed. This could account for some of the inert matter found by the seed laboratory at Sennar.

9. A seed growers certificate dated March 1, 1986 in summary states that seed of HD-1 were grown in the U.S.A. and that they were sampled by an official of and tested in, a laboratory of Texas.

10. A letter from Robert L. Hensz to USAID reports that contracted tonnage was reduced by freezing temperatures on December 14 and 15, 1985. The freezing temperatures are substantialed by weather

records from Hidalgo County, Texas.

11. A document entitled "Arrival Accounting" indicates that the ship on which seed of HD-1 were transported arrived in Port Sudan May 7, 1986, and the seed were unloaded from the ship June 4, 1986. Seed were transported by truck to Sennar and stored in the warehouse there.

In summary, the documents cited established that Tropical Seed Co. Inc. contracted with USAID Sudan to produce 200 tons of planting seed of Hageen Durra #1 (HD-1) sorghum hybrid. Seed production field(s) were planted by September 10, 1985. Freezing temperatures on December 14 and 15, 1985 reduced the production to 150 tons. Seed of HD-1 were shipped to Port Sudan and arrived there May 7, 1986. They were unloaded June 4, 1986 and transported to Sennar where they were stored in a warehouse. A report of germination tests dated August 5, 1986 showed the seed germinated only 7 to 9%.

Quality Determinations

Seed of HD-1 produced by Tropical Seed Co., Inc., which were stored in the warehouse at Sennar were sampled November 26, 1986 to obtain seed for testing to confirm or refute the report of loss of germination. Tropical Seed Co., Inc. had shipped the seed designated as a single lot - lot #1. In storing the seed in the warehouse three sublots were established and designated as 1-A, 1-B, and 1-C. Samples were taken with a standard seed probe, and a sufficient number of bags were sampled to represent 10% of the bags in each sublots. Lot 1-A consisted of 1447, 50 kg. bags, and 147 bags were sampled; lot 1-B consisted of 363 bags, and 36 bags were sampled; lot 1-C consisted of 1230 bags, and 110 bags were sampled.

Three bulked samples, one each from the three sublots, were taken to the Central Seed Testing Laboratory at Sennar. There they were mixed three

times through a Gamet Precision Divider before they were sequentially divided to obtain a working sample. A pure seed fraction was obtained from each working sample; 4, 100 seed subsamples from each of the three pure seed fractions were counted out for planting. Seed were planted in plastic pots in sand (100 seed per pot) wet properly, according to International Seed Testing Association (ISTA) Rules for Testing Seed. Pots were covered with glass and placed in the germination room which was controlled at 30 C.

Care was taken to maintain identity of samples from the warehouse into the germination room. As each sample was taken from each sublot, an identifying document (Label for Submitted Sample) was placed in the sample bag. This followed the seed into the laboratory where each sample was recorded into a log book or register. After tests are completed, purity analysis and germination tests are recorded into their respective ledgers. A report summarizing all test data is prepared and provided to interested parties.

The results of the germination test conducted during the period from November 26 to December 4 confirmed early reports that HD-1 seed from Tropical Seed Co., Inc. had indeed lost its ability to germinate. Only one normal seedling was produced from the 1200 seed planted.

Another test of the same seed was conducted, using rolled paper towels; again 1200 seed were tested and only 1 seed produced a normal seedling. There were 99.7% dead seed. Many of the dead seed had visible mold growth on them.

A physical examination of the seed of HD-1 from Tropical Seed Co., Inc. revealed that the seed were immature when they were harvested. Many of the seed were small and some were shriveled and shrunken. A normally mature seed should be plump and full. The endosperm of a mature seed of ATx623 or of ATx623 x Karper 1597 when bisected longitudinally, should reveal an outer

portion of corneous (hard) endosperm surrounding an inner portion of floury (soft) endosperm. The smaller seed of HD-1 appeared under a 10X hand lens to have essentially all floury endosperm. This is an indication of an improperly developed seed. Scientific literature indicates that immature seed do not retain their viability well in storage.

The fact that the seed are immature must mean that they were harvested at high moisture content, or the plants were killed in the field by use of a desiccant or by freezing. If they were harvested at high moisture, the moisture content must have been in the vicinity of 40% or higher for the seed to be as immature as they are. This means that the seed would have been very susceptible to mechanical damage by the combine and thus would have lost viability rapidly.

If the seed were dry when they were harvested, then the plants must have been desiccated by a chemical or by a freeze. At this time it is not possible to determine what stage the sorghum was in when the freeze occurred on December 14 and 15, 1985. Based on data reported by D.T. Rosenow et al. (Rosenow, D.T., A.J. Cassady, and E.G. Heyne. 1962. Effects of freezing on germination of sorghum seed. Crop Science. 2:99-101), it is unlikely that the 29 degree F reported by Hensz for Hildago County would have damaged the seed per se. However, since Hensz reported a reduced production as a result of the freeze, this could mean that the plants were killed by the freeze, and development of the seed was halted. This would account for the immaturity of the seed.

Another possibility is that the seed had to be harvested while they were immature in order to meet the shipment deadline. In this case the plants may have been killed by a desiccant or the seed were harvested at a high moisture content as mentioned earlier.

Seed of HD-1 produced by DeKalb Argentina remain in Port Sudan in

shipping containers. This shipment arrived July 24, 1986. As of December 2, 1986, when samples were taken from one shipping container, these seed had been in Port Sudan 130 days, well over four months.

According to the records, DeKalb shipped 500 tons of seed of HD-1, and seed were in bags of 40 kg each (approximately equal to 88 pounds). Seed were in metal shipping containers 20 ft. long x 8 ft. wide x 8 ft. high. Records indicated there were 28 such containers with 450 bags in each container. Only one container was opened for sampling. The seed were stacked to within about 1 to 1.5 feet from the top. This will require about 30,000 cubic feet for storage of all the DeKalb seed.

It was possible to sample seed that were visible through the door on one end of one container. One bag was opened, and a sample from this bag was taken. A sample obtained from several bags with a seed probe and composited into a bulk sample was placed in another plastic bag.

The two samples of HD-1 from DeKalb were taken to the seed laboratory at Sennar. The samples were mixed and divided in half by means of the Gamet Precision Divider. One half of each sample was left at Sennar for testing, and the other half was returned to Texas for testing.

Purity analysis and germination tests of seed left at Sennar will be conducted there, and results will be reported to USAID offices in Khartoum. The seed taken to Texas will be evaluated in the same manner, and results will be presented to USAID-Sudan in the final report.

The overall condition of the seed of HD-1 from DeKalb Argentina, appeared to be good. Based on the appearance of seed in the one container that was opened, there was no evidence that the seed had been wet or damaged, nor was there any indication of insects, rodents, or other pests.

The DeKalb seed were packaged in an inner polyethylene bag that resists moisture. This bag was tied securely and provided a water resistant

container. An outer bag of woven poly material was stitched closed, and identification was on a tag(s) sewn to each bag. The outer bag had identification stamped on each bag that was visible in the shipping container.

The seed were treated with Captan and Malathion according to records. There was a red dye treatment on the seed that indicated a seed treatment such as Captan had been used.

STORAGE FACILITIES

Objective No. 2: To make a survey of storage facilities run by the Government of Sudan in Port Sudan, Sennar, and Wad Medani and determine their adequacy, and make recommenda ons for resolving any specific or unusual problems, including proper treatment to control pests.

First, there are no special requirements for storing seed of HD-1. It will store under the same conditions as any other sorghum.

Port Sudan

The only storage facilities indicated at Port Sudan apparently were the shipping containers. These should provide adequate protection from rain and all pests except insects. The containers do not provide ventilation, and there is a likelihood that HD-1 seed stored in these containers has been exposed to high temperatures since the seed arrived in Port Sudan July 24, 1986. High temperatures are detrimental to viability of seed. Therefore, the seed in Port Sudan should be moved out as soon as possible to a suitable seed warehouse.

Sennar

The seed storage warehouse at Sennar was examined November 26, 1986. It is basically a sound structure and in good condition. The warehouse is a concrete and brick structure with a corrugated sheet metal roof and has a concrete floor. It is 50 meters long by 30 meters wide and approximately 4 to 4.5 meters high. It has 11 windows on each side that are covered with a heavy gage metal screen and a light weight screen with openings small enough to keep birds out. The bottom of the windows were about 2/3 the way up the walls and appeared to be about 1 to 1.5 meters high by 3 meters wide. There were metal doors on each end of the building.

There are some improvements that need to be made to provide optimum storage in this area.

1. The windows should be provided with coverings to keep rain out.

2. There are seams and/or cracks in the concrete floor that need to be caulked. As they are now, they provide a place for collection of dirt and trash and thus, a place to harbor insects.

3. There were some live moths in the warehouse and some live weevils in samples of HD-1 from Tropical Seed Co., Inc. There was very minor damage to the seed by weevils, indicating they had not been present in the seed but for a short time. The weevils probably gained access through holes made by the probe used in prior sampling. The warehouse should be sprayed and/or fumigated as soon as possible to prevent damage to other seed stored in the warehouse. Malathion is a recommended spray, and Phostoxin is a recommended fumigant. (Bulletin No. B-1410 included in this report.)

4. All seed should be stacked on wooden pallets to prevent their being in contact with the concrete floor. Seed not properly protected can pick up moisture from concrete which causes an increase in seed moisture. This, in turn, can result in loss of viability.

5. It would be desirable to have seed lots that are not so large as the HD-1 seed from Tropical Seed Co., Inc. A lot of 400 bags or less would be more desirable. The larger the lot, the less representative a sample from the lot is. Seed lots of 400 bags or less should be designated at the point of origin. The shipment of HD-1 from Tropical Seed Co., Inc. consisted of 3055 bags of seed. It was designated only as lot 1. It should have been designated as at least 8 separate lots.

There are several reasons for limiting lot size. As an example, a portion of a shipment could be damaged, and one or more lots could be isolated and preserved. A seed sample from a limited lot size should be more representative of the lot. Lots should be stored in a warehouse by lot number, on pallets, in rows with aisles between rows, so that every bag of a lot is accessible for sampling and inventory. If seed are stored in solid bags that must be punctured when samples are taken, the holes should be covered with tape to prevent seed spillage and to close access to insects. Good sanitation in seed storage areas is a necessity to assist in avoiding insects, rodents, and birds. Warehouses should be well ventilated to prevent build up of heat. This is not a problem at Sennar. Windows on each side provide good ventilation.

Wad Medani

Seed storage warehouses at Wad Medani (Gezira Board warehouses) were being fumigated on December 4, 1986. Thus it was not possible to examine the inside of them.

One of the warehouses was dedicated for wheat and another for sorghum and wheat. The warehouses were approximately 100 meters long by 40 meters wide. The construction was concrete, brick, and sheet metal. There were ventilation louvers along the ridge of the roof. In addition, it was reported that the doors were opened two days of the week for further aeration. The buildings were in a good state of repair on the outside. They should provide good storage facilities for seed if attention is given to other considerations for storing seed.

SEED STORAGE CONDITIONS

Objective No. 3: To make recommendations as to how to achieve optimum storage conditions to maintain viability of seed until the next planting season.

The following practices are recommended for optimum storage in this area.

1. Seed storage facilities should be inspected on a routine basis, and in the event there is a problem with pests, appropriate control measures should be taken. Malathion is a recommended spray in the event fumigation can not be done. Phostoxin is an approved fumigant that reportedly does not damage or reduce germination of seed. If seed are in moisture resistant bags they can not be treated effectively with spray or fumigant. On the other hand there should be no insects in seed in moisture resistant bags if seed are properly dried and fumigated before bagging.
2. Adequate ventilation should be provided to avoid build up of heat.
3. Seeds should be kept dry. For sorghum the desirable moisture should be within the range of 9% to 11%.
4. Cracks and/or seams in floors in particular should be caulked to remove a source for build up of trash and dirt and a harbor for insects.
5. Seeds should be stacked on pallets to keep them from being in contact with the concrete floor. Direct contact with the floor can result in moisture uptake by the seed. Such a condition can lead to more rapid decline in seed viability. Pallets should be in rows with an aisle between each row to facilitate sampling and inventory control, and to provide additional aeration.
6. Maintain good sanitation by cleaning seed warehouses to keep dirt

and trash to a minimum, and keep seed spillage cleaned up.

RECOMMENDATIONS FOR FUTURE PROCUREMENTS
OF USAID FINANCED SEED

1. Adequate lead time should be allowed when requesting bids (offers), to assure that seed can be produced during the normal growing season for the crop in question. Growing crops out of season, as was the case with HD-1 from Tropical Seed Co., Inc. is inviting trouble. Note the freezing temperatures in south Texas on 14 and 15 December 1985. If it becomes absolutely necessary to purchase seed on short notice out of season, then seed should be produced in a relatively dry climate near the equator where there are no "winter" temperatures or other adverse growing conditions. The other alternative is to have seed produced in the opposite hemisphere (as in the case of DeKalb of Argentina). Even then it should be specified that seed would have to be available on a desirable date, or the entire lot should not be accepted.

2. Because moisture content of seed is so critical, several recommendations are offered. The specifications, in addition to those included in "Request for Offers" for planting seed should include the following:

   a. Moisture content expressed as percentage for seed at the time of harvest should not be higher than 20% for sorghum. It would be preferable for moisture content to be 15 to 16%. Then the seed should be mechanically dried (with or without heat) by forcing air through the mass of seed. Drying temperatures should not exceed about 43 degrees C, especially if the seed are 20% or greater moisture. A sorghum seed may mature (physiologically mature = maximum dry weight accumulation) at moisture contents of 30 to 35%, but harvesting at this stage

would excessively damage the seed.

b. Moisture content of 10% after drying and at the time of bagging should be safe for sorghum seed if it is bagged in moisture resistant materials such as polyethylene bags. Such bags should not be stored in direct sunlight because a "greenhouse effect" can result, causing an increase in temperature inside the bag. Poly bags should be covered with a material that does not absorb sunlight.

3. Other factors to be considered in contracting for seed production should include:

a. Contracting should be done with a member in good standing of the American Seed Trade Association and/or his state Seed Trade Association. This does not in any way suggest that any party under consideration in the current contracts does not belong to such organizations. It does not exclude contracting with other countries, but any other country should also have similar organizations.

b. Provisions should be made for acceptance of contracted seed into the country in an orderly manner, and to see that seed are moved quickly into proper storage facilities in a central location such as Sennar. Or seed can be stored in locations where they will be used if adequate storage facilities are available.

INVENTORY CONTROL AND ACCOUNTING

Objective No. 4: To recommend a system for accounting and control of USAID financed seed in Sudan and to facilitate identifying seed movements and ultimate disposition.

An inventory control system identifying seed by kind (that is, crop), variety, lot number, and appropriate purity and germination information should be used to account for all seed financed by USAID. Inventory records should be kept at central storage locations as well as at terminal locations and/or distribution points. The inventory records should reflect current inventory amount (tons, kilograms, etc.) for each kind, variety, and lot number of seed in storage at all locations. Records from a central receiving and distribution point such as Sennar should show how much seed is on hand, and how much seed had been distributed, to whom or where, and the date of all transactions. This information should be reported to USAID offices at periodic intervals. The intervals should be specified by USAID officials, but they should be no less than at the beginning and end of the planting season. These records would reflect how much seed was distributed for planting and how much,if any, was left in storage to be carried over to the next planting season.

DISPOSITION OF HD-1 SEED FROM TROPICAL SEED COMPANY

Seed of HD-1 from Tropical Seed Company should be disposed of as quickly as possible because it has completely lost its ability to germinate and produce seedlings. It is good only for livestock feed provided it has not been treated with a fungicide or a long residual insecticide. Malathion should be a safe insecticide because it has a short residual. Fumigation with Phostoxin will leave no residue.

The seed do not appear to have been treated with any chemical. However, this should be verified by communication with Mr. Hensz of Tropical Seed Company, or by an assay or both.

II. INFORMATION OBTAINED IN TEXAS

Summary

Samples of seed of HD-1 obtained in Texas from Robert Hensz and from the Texas Department of Agriculture (TDA) Seed Laboratory appeared to be representative of the seed shipped to Sudan. Germination percentages of these samples ranged from 75 to 79%; these samples had been kept in refrigerated storage which would maintain viability for extended periods of time.

It is likely that the loss of viability (as indicated by germination tests) of HD-1 seed shipped to Sudan was a result of the immature condition of the seed, probably coupled with bagging of seed at too high moisture content in moisture resistant bags. These conditions made the seed susceptible to rapid deterioration in the high temperatures in Sudan.

SEED PRODUCTION INFORMATION

Information regarding production of HD-1 seed by Tropical Seed Co., Inc. in the Rio Grande Valley of Texas during the fall of 1985 was obtained from Robert L. Hensz, president of the company. In a telephone communication with Mr. Hensz after return of this author to Texas, he provided the following information.

1. Parents of HD-1 were planted in a crossing block (or blocks) near the end of August to the first of September, 1985.
2. Sorghum was in the hard dough stage when freezing temperatures occurred December 14 and 15, 1985. Weather data from Hidalgo County show 29°F minimum on these days. Other weather data from Brownsville and Weslaco (Appendix "B") show temperatures near freezing or slightly below for this period. Weslaco is in Hidalgo County, and Brownsville is in Cameron County, adjacent to and east of Hidalgo.

3. Seed were harvested about Christmas, 1985 at 18% seed moisture. Seed were subsequently dried with unheated, forced air o 14% moisture before processing.

4. Seed were processed (cleaned) and bagged in polyethylene inner bags and woven polyproplylene outer bags.

5. No fungicide was applied to the seed.

Mr. Hensz indicated that the freezing temperatures in December did not kill the sorghum plants, because the leaves were still green at harvest. He further indicated that there was little rain to cause significant deterioration of seed during the seed development stage which occurred during the period from early November through December. Weather data from Brownsville and Weslaco (Appendix "B") show there was not a large amount of rain, but there were a number of days with small amounts of rain. This is conducine to discoloration of seed from field molds, and undoubtedly caused the discoloration of HD-1 seed observed in Sudan.

Temperatures during late November and December had dropped below the level for optimum growth and development of sorghum. This must account for the immaturity of the seed of HD-1. The indication by Mr. Hensz that seed moisture was 18% at harvest refutes earlier conjecture by this author that the seed may have been harvested at high moisture content. Sorghum seed at 18% moisture should not be damaged by the combine operation.

There was no indication by Mr. Hensz that seed moisture was below 14% when the seed were bagged. If the seed were at 14% moisture when they were placed in the moisture resistant polyethylene bags, this could have contributed to the loss of viability when the seed were exposed to the high temperatures during the summer of 1986 in Sudan. To reiterate, immature seed do not store well.

EVALUATION OF SEED

Seed from Tropical Seed Co., Inc.

Samples of HD-1 seed were obtained from Mr. Hensz and from the Texas Department of Agriculture (TDA) seed laboratory. The physical appearance of the seed indicates the samples probably are representative of the lot of seed shipped to Sudan. There is a relatively high percentage of small, shrunken seed in all samples observed, indicating that seed are immature. All samples showed discoloration due to field molds. Memory is deceiving with regard to color, and the only reasonably accurate color comparisons would have to be made in side-by-side comparisons. Samples of seed from Tropical Seed Co., Inc. have not been received into the U.S. from Sudan at this time. Photographs taken are of different quality due to lighting and background, and do not provide valid color comparisons. Therefore, photographs are not included.

Seed samples from both the above sources were tested for germination. The sample from Mr. Hensz was tested by the author. It germinated 79% with 2% abnormal seedlings and 19% dead seed.

The TDA laboratory retested the sample of HD-1 seed they kept in storage (Laboratory No. G98749) by two approved methods. The results showed germination percentages of 76 and 75; there were 5% abnormal seedlings in each test and 19% and 20% dead seed, respectively.

The above referenced seed samples were stored in refrigerated storage conditions. Mr. Hensz indicated his sample of HD-1 seed was in the refrigerator, and the TDA laboratory maintains storage conditions of approximately 45°F and 55% relative humidity. These storage conditions will maintain viability for long periods of time.

In addition to laboratory tests, information was obtained on stands of plants in the winter grow-outs for genetic purity in Puerto Rico. Average.

stand count was 5575 plants per 1/10 acre. This compared to stands of 5900, 6000, 5800, 6200, and 6000 per 1/10 acre for adjacent entries of other hybrids. Seed of HD-1 used in the grow-out were not necessarily from the same sample submitted to the laboratory, but they represented the same lot of seed.

It must be concluded from all the information available that there are no readily apparent discrepancies among seed samples. Further, it is likely the rapid loss in viability by HD-1 seed from Tropical Seed Co., Inc. shipped to Sudan was a result of the immature condition of the seed, possibly bagged at slightly too high moisture content, and subjected to high temperatures during the summer in Sudan.

Seed from DeKalb of Argentina

Samples of seed of HD-1 from DeKalb of Argentina were returned to Texas from Sudan. A germination test was conducted on the two samples. The composite sample from several bags germinated 74% with 8% abnormal seedlings and 18% dead seed. The sample from the single bag germinated 73% with 11% abnormal seedlings and 16% dead seed.

At this time the DeKalb seed of HD-1 are acceptable for planting if the two samples obtained are representative of the several lots. These seed should be moved to appropriate warehouses as soon as possible. Each lot should be sampled properly by the seed laboratory personnel at Sennar and tested for germination before they are moved out for planting. Dr. Banerjee and his people are very capable people and will provide good test results for the seed.

APPENDIX "A"

Documents Pertaining to History of HD-1 Seed

from Tropical Seed Co., Inc.

A1-L

[illegible]

[illegible]
86 08 1887
ACPER [illegible]

[illegible]
AUGUST 8, 1985
TROPICAL SEED COMPANY
ATTN: MR. BOB HENEE
MOA/85-01/DRS FOR HD-1 HYBRID SORGHUM SEED

THE EMBASSY OF THE DEMOCRATIC REPUBLIC OF SUDAN ON BEHALF OF THE MINISTRY OF AGRICULTURE REQUESTS THAT YOUR FIRM SUBMIT OFFERS NOT LATER THAN 11 A.M. CEST) ON AUGUST 13, 1985 FOR THE FOLLOWING:

A. COMMODITY: HYBRID SORGHUM SEED - VERIFIED VARIETY HAGEEN DURA NUMBER ONE (HD-1), WHITE SEEDED SORGHUM PRODUCED FROM THE FEMALE A-LINE PARENT, TEXAS 623 X MALE R-LINE PARENT, KASPER KARPER 1597 1597.

B. QUANTITY: 800 - 1,000 METRIC TONS, BUYER'S OPTION, SUBJECT TO THE AVAILABILITY OF FUNDS.,

C. AUTHORIZED A.I.D. GEOGRAPHIC CODE FOR SOURCE/ORIGIN OF COMMODITY AND FREIGHT AND FOR NATIONALITY OF SUPPLIER IS CODE 941 (UNITED STATES AND SELECTED FREE WORLD).

D. TERMS: OFFERS MUST BE SUBMITTED ON THE BASIS OF BOTH:
   1. F.A.S. VESSEL, NAMED PORT OF LOADING, AND
   2. C. AND F. PORT SUDAN, SUDAN, VIA U.S. OR OTHER CODE 941 FLAG VESSEL
   3. OFFERS MUST INCLUDE THE SUPPLIER'S PROPOSED PRODUCTION/DELIVERY SCHEDULE.

E. PACKAGING: 50 OR 100 POUND JUTE, OR BOLAL EXPORT SHIPPING BAGS. ALL BAGS MUST MEET A.I.D. SPECIFICATIONS. A.I.D. MARKING REQUIREMENTS APPLY. SEED SHALL BE CLEANED AND FUMIGATED WITH PHOSTOXIN PRIOR TO BAGGING.

F. SUPPLIER SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED INSPECTIONS AND CERTIFICATIONS.

G. DELIVERY: C.AND F. PORT SUDAN, SUDAN NO LATER THAN MAY 1-15, 1986.

H. PENALTY: A PENALTY OF ONE (1) PERCENT OF THE CONTRACT VALUE OF THE DELAYED COMMODITIES WILL BE ASSESSED PER WEEK UP TO FIVE (5) PERCENT FOR LATE DELIVERY, EXCEPT WHEN CAUSED BY FORCE MAJEURE.

I. OFFER SECURITY - OFFERS MUST BE ACCOMPANIED BY A U.S. DOLLAR

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BOND; OR FOR TELEXED OFFERS ADEQUATRE EVIDENCE SATISFACTORY TO THE PURCHASER THAT SUCH A BOND HAS BEEN ESTABLISHED PRIOR TO THE OFFER DEADLINE. IN THE AMOUNT OF FIVE (5) PERCENT OF THE OFFER PRICE. BOND MUST BE VALID FOR FIFTEEN DAYS FROM THE OFFER DEADLINE.

J. TELEXED OR WRITTEN OFFERS MAY BE SUBMITTED TO THE FOLLOWING ADDRESS: EMBASSY OF THE DEMOCRATIC REPUBLIC OF SUDAN, OFFICE OF THE ECONOMIC COUNSELLOR, 2210 MASSACHUSETTS AVE., N.W. WASHINGTON, D.C. 20008, TELEX NO. 440238 SUD ECO WSH. OFFERS MUST BE VALID UNTIL CLOSE OF BUSINESS AUGUST 16, 1985. OFFERS BY TELEPHONE WILL NOT BE ACCEPTED.

K. AWARD(S) WILL BE MADE TO THE RESPONSIBLE AND RESPONSIVE OFFEROR(S) WHOSE OFFERS HAVE BEEN DETERMINED TO RESULT IN THE LOWEST OVERALL DELIVERED COST PER METRIC TON FOR TOTAL REQUIREMENT.

L. SUCCESSFUL OFFEROR(S) WILL BE REQUIRED TO ESTABLISH A PERFORMANCE GUARANTY IN THE AMOUNT OF TEN (10) PERCENT OF THE TOTAL CONTRACT VALUE WITHIN FIVE WORKING DAYS OF RECEIPT OF NOTICE OF AWARD. GUARANTY MUST BE VALID UNTIL JUNE 30, 1986.

M. PAYMENT: THE PURCHASER WILL INSTRUCT A.I.D. TO ISSUE A DIRECT LETTER OF COMMITMENT IN FAVOR OF THE SUPPLIER WITHIN TEN (10) DAYS OF AWARD IN AN AMOUNT EQUAL TO THE AGREED CONTRACT PRICE AND PAYABLE IN U.S. DOLLARS. ANY REQUEST FOR PROGRESS PAYMENTS SHOULD BE SET FORTH IN THE OFFER(S). PROGRESS PAYMENTS ARE SUBJECT TO THE CONDITIONS SET FORTH IN SECTION 201.25 OF A.I.D. REGULATION 1. NOT MORE THAN 80 PERCENT OF THE F.A.S. PRICE OF THE SEED WILL BE PAID UPON EVIDENCE OF ACTUAL COSTS EXPENDED, SUCH AS PAID CONTRACTS WITH GROWERS, PARENT SEED PURCHASED, ETC. SUPPLIERS WILL BE REQUIRED TO ESTABLISH A PERFORMANCE GUARANTY OR PREPAYMENT BOND FOR EACH PROGRESS PAYMENT.

N. THIS PROCUREMENT WILL BE FINANCED UNDER UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT GRANT 680-K-6083. ALL PROVISIONS OF A.I.D. REGULATION 1 ARE APPLICABLE TO THIS TRANSACTION. THIS RFQ IS SUBJECT TO THE NEGOTIATED COMPETITIVE PROCUREMENT PROCEDURES SET FORETH IN SECTION 201.23 OF A.I.D. REGULATION 1.

SINCERELY,
MR. MAMOUN O. MEDANI
ECONOMIC COUNSELLOR
EMBASSY OF SUDAN.NOTE:
NOTE: IN LINE NO. 1, PLS INSERT RFQ BEFORE MOR/83-01/DRS.
S
ACFER UD

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A2-k

AUG 16 1985 1617Z
440238 SUDECO WSH

(2)

EPSYLINK 214518-001 16AUG85 15:30/17:25 EST
FROM: 62836330
ACFER INTERNATIONAL
TO: 71440238

EMBASSY OF THE DEMOCRATIC REPUBLIC OF SUDAN,
OFFICE OF THE ECONOMIC COUNSELOR
2210 MASSACHUSETTS AVE.,N.W.
WASHINGTON, D.C. 20008

AUG.16, 1985

REF.YOUR TELEX AUG.6,1985 MOA/85-01/DRS FOR HD-1
HYBRID SORGHUM SEED

TROPICAL SEED CO.SUBMITS THE FOLLOWING OFFER:

A. QUANTITY: 200 METRIC TONS OF HAGEEN DURA NUMBER ONE (HD-1)-
PRODUCED IN
SOUTH TEXAS (CODE 9410)-PACKAGED 50 LB.BAGS ON PALLETS.

B. PRICE:

(1) F.A.S. PORT OF HOUSTON,TEXAS.
$53.50 ~~U.S.DOLLAR/100 LBS.~~ FOR A TOTAL OF 200 MT-$235,862.80
DLS.

(2) C AND F: PORT SUDAN VIA US FLAG SHIP

(A) IN 20 FT. LONG CONTAINERS TOTAL FOR 200 MT:- $274,516.16
U.S.
DOLLARS.

(B) ON PALLETS ONLY-TOTAL FOR 200 MT:$275,073.40 U.S. DOLLARS

(A & B PRICES DO NOT INCLUDE UNLOADING AT PORT SUDAN)

ALL FREIGHT AND HANDLING CHARGES ARE BASED ON TODAY'S RATES AND
CONDITIONS.

55.5 1/2k 440,42 + line (200) × (2204.12 / 1000)

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A2-22

THEY WILL PROBABLY BE DIFFERENT BY MARCH OF 1986.

C. DELIVERY SCHEDULE: SHIPMENT FROM PORT HOUSTON BETWEEN MAR 15/85 AND MAR
31/85, OR BEFORE, UNLESS AFFECTED BY ANY ACT OF GOD OR FORCE MAJEURE.

D. PACKAGING: BAGS THAT MEET A.I.D.SPEC.AND SEEDS WILL BE CLEANED AND FUMI-
GATED WITH PHOSTOXIN PRIOR TO BAGGING.TROPICAL SEED WILL BE RESPONSIBLE FOR
OBTAINING ALL REQUIRED INSPECTIONS AND CERTIFICATIONS.

E. OFFER SECURITY: MR.SAM TISDALE,CHAIRMAN OF INTERFIRST BANK OF HARLINGEN,
TEXAS PH.(512) 423-4530 ,IS FORWARDING TO YOU (THIS DATE) A LETTER OF
CREDIT, COVERING 5/ OF THE GREATEST AMOUNT OF DOLLARS CONTAINED IN
THIS OFFER.

F. VALIDITY: THIS OFFER IS VALID UNTIL AUG.23, 1985.

G. PAYMENT: LETTER OF CREDIT IN U.S. DOLLARS WITH PROGRESS PAYMENTS AGAINST
COST EXPENDED DURING PRODUCTION OF SEED WITH A MAXIMUM OF 80/ OF CONTRACTED
PRICE.

WE AGREE WITH ALL TERMS & CONDITIONS OF YOUR SOLICITATION

NOTE&&& FOR YOUR INFORMATION, NEXT YEAR WE WILL BE CAPABLE OF PRODUCING ANY
AMOUNT OF THIS EXACT VARIETY OF SEED (HD-1).

TROPICAL SEED CO. INC.
BOB HENSZ
PRESIDENT
TELEX NO. 314385 (ACFER UD)

MMMM

TROPICAL SEED CO., INC.

ROUTE 3, BOX 231
HARLINGEN, TEXAS 78550
PHONE 512/423-3726

AGREEMENT

THIS AGREEMENT, made and entered into this 30th day of AUGUST 1985 by and between BOB HENSZ FARMS of HARLINGEN TEX., hereinafter referred to as "Grower," and Tropical Seed Co., Inc. a Texas corporation, hereinafter referred to as "Company."

WITNESSETH:

In consideration of the covenants herein, the parties hereto agree as follows:

1. Grower agrees to produce approximately 310 acres of hybrid seed sorghum HD-1; stock seed to be planted in the ratio of 2 rows of male pollen parent to 10 rows of female seed parent. Grower agrees to maintain isolation of the seed field from other fields of sorghum by a minimum of 40 rods whenever contamination from foreign pollen could be a problem. Grower further agrees to plant said seed only in fields on which the previous crop planted was other than sorghum.

2. All stock seed required to be used under this agreement shall be furnished by Company, at no charge, with any portion remaining unused after planting to be returned to Company. Stock seed supplied hereunder and all crops resulting from pollen parent rows and seed parent rows on the contract acres shall remain the property of Company.

A 3-2

3. Grower agrees to plant stock seed at the rate of approximately 9 LBS. per acre for the seed parent and 4 LBS. per acre for the pollen parent.

4. Grower agrees to plant all of the acreage contracted hereunder by 10 SEPT, 1985.

Special delayed planting provisions:

N/A

If fields are not planted by 10 SEPT, 1985, Company may at its option cancel any acreage not yet planted. Company shall have no obligation for any payments on any of such cancelled acreage, but this agreement shall continue in full force and effect for those acres which have been planted by 10 SEPT, 1985.

5. Grower, at his expense, shall remove all volunteer sorghum and/or Johnson grass from within the seed fields and from adjacent fields a distance of 40 rods from the edge of the field, before any pollen is produced by such volunteer sorghum and/or Johnson grass. If for any reason Grower does not remove said volunteer sorghum and/or Johnson grass, Company reserves the right to enter the contract fields and remove same at Grower's expense.

6. Grower agrees to bring the seed sorghum planted on the contract acreage to a harvestable condition, including supplying all labor and materials necessary for cultivation, fertilization, irrigation, and weed control. All said care shall be performed in a good farmer-like manner. Company shall pay the cost of supplying INSECT CONTROL.

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Company shall assume responsibility for all roguing, harvesting, and seed processing operations on the resulting crop.

7. Company shall pay Grower for Grower's performance of the terms and conditions of this agreement, including tillage, planting, and cultural operations, at the following rate:

$ 330.00 per total acre produced of suitable crop; or

$ 12.00 per bushel of dry sorghum from female rows, whichever rate is higher.

When payment is made pursuant to the second rate above, a minimum germination of 80% is required. It is expressly understood, moreover, that if sorghum from the male pollen parent rows is harvested and sold by Company, any proceeds derived therefrom shall inure solely to Company. In the event delayed planting is provided for in paragraph 4 above, Company shall pay Grower and additional amount of $ N/A per acre of suitable crop produced.

8. Company shall pay grower according to one of the two schedules outlined below:

(a) An advance payment of _____ by _____, 19__, balance payable hereunder to be remitted to Grower by _____ _____, 19__, or

(b) An advance payment of $225.00/acre, to be paid after sorghum heads are established with seed, balance payable hereunder to be remitted after harvest has been completed.

Payment schedule B is hereby chosen to apply.

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A 3-4

9. In the event the seed fields produced by Grower are destroyed or damaged by hurricane or other natural disaster or, in the sole discretion of Company, the crop produced hereunder is unsuitable for hybrid seed sorghum purposes, the quaranteed minimum compensation of $ 330.00 per total acre shall no longer apply, and Company may at its option cancel this agreement and be under no obligation for the payments herein specified.

10. Company shall have the right at all reasonable times to enter upon Grower's property, including the contract acreage where Company's seed is planted, to observe the production of the seed sorghum covered under this agreement.

11. Any controversy or claim hereunder shall be settled by arbitration at a mutually agreeable location in accordance with the rules of the American Arbitration Association.

12. It is agreed that the Grower is an independent contractor and not an employee of the Company.

13. Grower agrees to indemnify Company against any expense, loss, or liability incurred as a result of carelessness or negligence on the part of Grower or his servents, agents, or employees. Grower further agrees to save and hold harmless Company from any and all liability arising out of workmen's compensation laws or any other state or federal statutes relating to employer-employee relationships.

14. This agreement shall be binding upon successors, administrators, heirs, or assigns of both parties hereto, and Grower shall not assign this agreement, in whole or in part, without the express written permission of Company.

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IN WITNESS WHEREOF, the parties hereto have executed this agreement, in duplicate, the day and year first above written.

GROWER

TROPICAL SEED CO.,INC.

Bob Hensz
BOB HENSZ FARMS

By: Robert L. Hensz
PRESIDENT

I hereby approve and confirm in all respects the foregoing contract signed by my tenant, Grower above, and do hereby waive landlord's lien on crops produced thereunder.

Date: 30 AUG 85

OWN
~~Landlord~~

A4

February 4, 1986

A.I.D. Letter of Commitment No. 650-K006B19

Mr. Robert L. Hensz, President
Tropical Seed Co., Inc.
Rt. 3, Box 231
Harlingen, Texas 78552

Dear Mr. Hensz:

Please be advised that your application to the State Seed and Plant Board for certification eligibility of Hagean Dura I (HD-I) sorghum variety was approved at the January 27, 1986 meeting.

If you have any questions, please call on me.

Sincerely,

Kenneth Boatwright

Kenneth Boatwright
Director, Seed Program

KB:ctl

cc: State Seed and Plant Board
Fred Woodward

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#5 5 H 5

TOWN & COUNTRY PEST & WEED CONTROL

RT. 3 BOX 42
ROBSTOWN, TEXAS 78380
PHONE: 387-1634

A.I.D. Letter of Commitment No. 650-K606B19

To whom it may concern:

This is to confirm on the March 6, 1986.

THAT THE M/C in tank #5 was Fumigated

Located at Tropical Grain Co Harlingen Tex

Treated with 55% Aluminum Phosphide (Phostoxin).

At a dosage of 45 tablets (45 Grams) the hour cost of Space

Atmosphere temperature was above 68°F or Above.

Exposure time of Three Days.

By: William J. Ordner Certified Applicator Lic #21227 PTB FU. 379

Date :

THE STATE OF TEXAS

COUNTY OF NUECES

Before ME, the undersigned authority, a Notary Public in and for said county and state, on this day personally appeared William J. Ordner, known to me to the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

Given under my hand and seal of office, this the 6 day of March.

Notary Public in and for
Nueces County, Texas

TEXAS DEPARTMENT OF AGRICULTURE
SEED LABORATORY

March 14, 1986

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$7.00

DESIGNATED BY SENDER SORGHUM, HAGEEN DURA 1

SENDER TROPICAL SEED CO., INC.
RT. 3, BOX 231
HARLINGEN, TX., 78552

ACCT NO 20615
TAXPAYER OUTLET NO

KIND 231

	% PURE SEED	% INERT MATTER	% OTHER CROP SEED	% WEED SEED	% GERMINATION	% HARD SEED	% DORMANT SEED
Sorghum	99.86	0.14	0.00	0.00	80.00	0.00	0.00

NOXIOUS WEEDS PER POUND: NONE

OTHER CROP SEED:

WEED SEED:

In our experience, sorghum seed usually is germination can be completed by 7 days, and a 5 day test would be reasonable if the seed were good quality.

ADDITIONAL INFORMATION:

DISTRICT NUMBER: 7

DATE COMPLETED: 03-19-86

March 19, 1986

SIGNED: Randy Kossuth
Seed Analyst

[illegible] by the sender and no attempt was made to [illegible] other similar samples representing field or

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The tolerances are not appropriate when testing whether one analysis is either significantly poorer or significantly better than another, (i.e., to decide (1) whether two laboratories obtain reasonably similar analyses or (2) whether one laboratory duplicates its analyses reasonably well). In this case, there is no "first" analysis and no "second" analysis as indicated above.

There are two sets of tolerances: "Regular" tolerances and "Special" tolerances.

b. *Regular tolerances.*—The regular tolerances in Table 6 are used when the sample contains only one kind of pure seed or when it contains more than one kind or cultivar but all have nearly the same weight per seed (the same number of seeds per gram). To determine the tolerance, average the first and second analyses. The tolerance is on the line which has the average of the two analyses in Column A or B.

Example 1: A lot is of unmixed chaffy seed. The tolerance for chaffy seed is in column D of Table 6. The percentages of pure seed in the first and second analyses, respectively, are 89.65 and 87.55; the average is 88.60; and the apparent deficiency is 2.10 (89.65-87.55) The average is between 88.00 and 89.99, which are on a line in column A. Therefore, the tolerance is 2.19. Since the apparent deficiency does not exceed the tolerance, the deficiency is not considered real and the percentage of pure seed given on the label may be considered satisfactory.

Table 6. Regular tolerances for any component of a purity analysis

Average analysis A	Average analysis B	Nonchaffy seeds C	Chaffy seeds D
99.95 – 100.00	0.00 – 0.04	0.13	0.16
99.90 – 99.94	.05 – .09	.20	.23
99.85 – 99.89	.10 – .14	.24	.29
99.80 – 99.84	.15 – .19	.28	.34
99.75 – 99.79	.20 – .24	.32	.37
99.70 – 99.74	.25 – .29	.35	.41
99.65 – 99.69	.30 – .34	.37	.45
99.60 – 99.64	.35 – .39	.40	.48
99.55 – 99.59	.40 – .44	.42	.50
99.50 – 99.54	.45 – .49	.44	.53
99.40 – 99.49	.50 – .59	.47	.57
99.30 – 99.39	.60 – .69	.51	.60
99.20 – 99.29	.70 – .79	.54	.64
99.10 – 99.19	.80 – .89	.57	.66
99.00 – 99.09	.90 – .99	.59	.70
98.75 – 98.99	1.00 – 1.24	.64	.75
98.50 – 98.74	1.25 – 1.49	.71	.82
98.25 – 98.49	1.50 – 1.74	.76	.89
98.00 – 98.24	1.75 – 1.99	.82	.95
97.75 – 97.99	2.00 – 2.24	.87	1.01
97.50 – 97.74	2.25 – 2.49	.92	1.07
97.25 – 97.49	2.50 – 2.74	.96	1.12
97.00 – 97.24	2.75 – 2.99	1.00	1.17
96.50 – 96.99	3.00 – 3.49	1.06	1.24
96.00 – 96.49	3.50 – 3.99	1.14	1.34
95.50 – 95.99	4.00 – 4.49	1.21	1.41
95.00 – 95.49	4.50 – 4.99	1.27	1.49
94.00 – 94.99	5.00 – 5.99	1.36	1.60
93.00 – 93.99	6.00 – 6.99	1.47	1.73
92.00 – 92.99	7.00 – 7.99	1.58	1.85
91.00 – 91.99	8.00 – 8.99	1.67	1.96
90.00 – 90.99	9.00 – 9.99	1.75	2.06
88.00 – 89.99	10.00 – 11.99	1.87	2.19
86.00 – 87.99	12.00 – 13.99	2.01	2.36
84.00 – 85.99	14.00 – 15.99	2.14	2.51
82.00 – 83.99	16.00 – 17.99	2.24	2.64
80.00 – 81.99	18.00 – 19.99	2.35	2.76
78.00 – 79.99	20.00 – 21.99	2.44	2.86
76.00 – 77.99	22.00 – 23.99	2.52	2.96
74.00 – 75.99	24.00 – 25.99	2.59	3.04
72.00 – 73.99	26.00 – 27.99	2.65	3.12
70.00 – 71.99	28.00 – 29.99	2.71	3.19
65.00 – 69.99	30.00 – 34.99	2.80	3.29
60.00 – 64.99	35.00 – 39.99	2.89	3.40
50.00 – 59.99	40.00 – 49.99	2.96	3.48

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H 8 - 1

NATIONAL SEED ADMINISTRATION

(ADB/ADF SEED PRODUCTION PROJECT)

MINISTRY OF AGRICULTURE & NATURAL RESOURCES

P. O. BOX : 285 - KHARTOUM (SUDAN)

TELEPHONE : 71774
CABLE : TAGAWI
KHARTOUM

TELEX : 22718 PCFAO

REF. : NA/NSA/SP/Gen/61

DATED : 26th August 1986

Dear Sir,

Subject:- Hageen Dura I

We have received Hageen Dura I (Hybrid Sorghum) seed thru U. S. Agency of International Development.
Representative samples were taken from 3 sub lots. The samples were analysed in the central seed testing laboratory at Sennar.

All the samples show very poor germination percentage.

Attached, please find copies of 3 reports and a copy of the statement given by Director, Seed Certification Administration and the Seed Technologist at Sennar.

You may please examine the report and submit your comments to us or to U S A I D.

Thanking you.

Yours faithfully,

Director General
National Seed Administration, Khartoum

To,
Tropical Seed Co. Inc.
Rt 3, Box 231, Harlingen
Texas 78552
U. S. A.

cc: Dr. George Ghobrial, Senior Agronomist, USAID, Kuwaiti Tower Building, Khartoum

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إدارة إكثار وتحسين البذور
(PLANT PROPAGATION ADMINISTRATION)

82 № 0767

قسم فحص واعتماد البذور
(SEED TESTING & CERTIFICATION SECTION)

ص . ب ٢١
P. O. Box 21)

سنار (SENNAR) السودان (SUDAN)

تليفون ٢١٦٠
(TEL. 2160)

21.8.1986 التاريخ (DATE)

تقرير فحص البذور
(SEED TESTING REPORT)

August 5, 1986

Certified	الدرجة (CATEGORY)	5.8.1986	تاريخ الاستلام (DATE OF RECEIVING)
Sorghum	المحصول (CROP)	Tropical Seed Co. Texas, USA.	المنتج (PRODUCER)
Hageen Dura 1	الصنف (VARIETY)	1 - A	نمرة اللوط (LOT NO.)
86/87-30	رقم الاختبار (TEST NO.)	August 6, 1986 6.8.1986	تاريخ الاختبار (DATE OF TEST)
:	فحص النقاوه (PURITY TEST %)		اختبار الانبات % (GERMINATION TEST %)
98.3%	بذور نقية (PURE SEED)	7%	انبات عادى (NORMAL SEEDLING)
- 0.0 -	بذر اخرى (OTHER SEEDS)	11%	انبات غير عادى (ABNORMAL SEEDLING)
1.7%	مواد خامله (INERT MATTER)	0	بذور ساكنه (DORMANT SEEDS)
-	اختبار الرطوبة (MOISTURE CONTENT)	82%	بذور متيبنه (DEAD SEEDS)

اختبارات اخرى (OTHER TEST)

Biochemical test (Tetrazolium method) was conducted and 8% germinable seeds were found.

ملحوظات (REMARKS)

Seed lot improperly graded, high proportion of broken, shrivelled, discoloured and compressed seed were found .

الى (TO)
Director General, NSA,
Ministry of Agriculture,
Khartoum

الضابط المسئول
(OFFICER - IN - CHARGE)
Director, S.C.A., Sennar

SEED CERTIFICATION ADMINISTRATION, Ministry of Agriculture, Govt. of Sudan
ادارة اكثار وتصديق البذور
(PLANT PROPAGATION ADMINISTRATION)

A8-3

82 No. 0768

قسم فحص واعتماد البذور
(SEED TESTING & CERTIFICATION SECTION)

ص . ب
O. Box 21)

سنار (SENNAR) السودان (SUDAN)

تليفون ٢١٦٠
(TEL. 2160)

21.8.1986
التاريخ
(DATE)

تقرير فحص البذور
(SEED TESTING REPORT)

Certified	الدرجة (CATEGORY)	5.8.1986	تاريخ الاستلام (DATE OF RECEIVING)
Sorghum	المحصول (CROP)	Tropical Seed Co., Texas, USA	المنتج (PRODUCER)
Hageen Dura 1	الصنف (VARIETY)	1 - B	نمرة اللوط (LOT NO.)
86/87-31	رقم الاختبار (TEST NO.)	6.8.1986	تاريخ الاختبار (DATE OF TEST)
	فحص النقاوه (PURITY TEST %)		اختبار الانبات % (GERMINATION TEST %)
98.6%	بذور نقية (PURE SEED)	7%	انبات عادى (NORMAL SEEDLING)
- 0.0 -	بذر اخرى (OTHER SEEDS)	11%	انبات غير عادى (ABNORMAL SEEDLING)
1.4%	مواد خامله (INERT MATTER)	0	بذور ساكنه (DORMANT SEEDS)
-	اختبار الرطوبة (MOISTURE CONTENT)	82%	بذور متينه (DEAD SEEDS)

Biochemical test (Tetrazolium method) showed 9% germinable seeds . — اختبارات اخرى (OTHER TEST)

High proportion of shrivelled, discoloured, broken, compressed and ungraded seeds present. — ملحوظات (REMARKS)

Director General, N.S.A.,
Ministry of Agriculture
Khartoum

الى (TO)

الضابط المسئول
(OFFICER - IN - CHARGE)
Director, S.C.A., Sennar

A.8-4

إدارة إكثار وتعتمين البذور
(PLANT PROPAGATION ADMINISTRATION)

82 No. 0700

قسم فحص واعتماد البذور
(SEED TESTING & CERTIFICATION SECTION)

س . ب ٢١
(P. O. Box 21)

سنار (SENNAR) السودان (SUDAN)

تلفون ٢١٦٠
(TEL. 2160)

التاريخ 21.8.1986
(DATE)

تقرير فحص البذور
(SEED TESTING REPORT)

Certified	الدرجة (CATEGORY)	5.8.1986	تاريخ الاستلام (DATE OF RECEIVING)
Sorghum	المحصول (CROP)	Tropical Seed Co., Texas, USA	المنتج (PRODUCER)
Hageen Dura 1	الصنف (VARIETY)	1 - C	نمرة اللوط (LOT NO.)
86/87-32	رقم الاختبار (TEST NO.)	6.8.1986	تاريخ الاختبار (DATE OF TEST)
:	فحص النقاوه (PURITY TEST %)		اختبار الانبات % (GERMINATION TEST %)
97.7%	بذور نقية (PURE SEED)	9%	انبات عادى (NORMAL SEEDLING)
- 0.0 -	بذر اخرى (OTHER SEEDS)	7%	انبات غير عادى (ABNORMAL SEEDLING)
2.3%	مواد خامله (INERT MATTER)	0	بذور ساكنه (DORMANT SEEDS)
-	اختبار الرطوبة (MOISTURE CONTENT)	84%	بذور متينه (DEAD SEEDS)

اختبارات اخرى (OTHER TEST)

Biochemical test (Tetrazolium method) showed 9% germinable seeds .

ملحوظات (REMARKS)

High proportion of discoloured, broken, ungraded, shrivelled, compressed, immature seeds were found.

الى (TO)
Director General, N.S.A.,
Ministry of Agriculture
Khartoum

الضابط المسئول
(OFFICER - IN - CHARGE)
Director, S.C.A., Sennar

A 8-5

Statement regarding a seed lot (Sorghum - Hageen dura 1) produced at USA and imported by MIA

Crop : Sorghum bicolor

Cultivar : Hageen Dura 1

Quantity : 152 tons (3040 bags of 50 Kg each)

Lot : Lot No.1 (normally 10 tons constitutes a lot in sorghum) For convenience three sub-lots were identified in the store depending on their location :

Sub-lot : 1-A - 1365 bags
Sub-lot : 1-B - 365 bags
Sub-lot : 1-C - 1310 bags

Packaging: seeds were packed in bags (50 Kg each) made of synthetic woven material on the outside and a polyethylene bag inside; bags were machine stiched ; all the bags were labelled with certification tags and quality labels.

Seed details: The seed was produced in USA (Texas) by M/s Tropical Seed Co. Inc., Rt.3, Box 231, Harlingen, Texas,78552; under the contract No.650-KC06618 dated 6/23/85. The seed belonging to 'Certified' category was certified (for genetic identity only) by the Texas Department of Agriculture (Member of Association of Official Seed Certifying Agencies). The vendor's statement of analysis indicated : Pure seed - 98.0%, Inert - 1.99%, Other crop seed- 0.01%, weed seed- 0%, noxious weed seed - none, germination - 80%, tested March,1986.

Quality tests at Sennar (main) : Sampling and subsequent laboratory testing were done following ISTA rules. Germinability of the seed lot(s) varied between 7 to 9%. The biochemical test (Tetrazolium test) also confirmed this result. Purity analysis indicated high proportion of discoloured, shrivelled, broken, ungraded, compressed and immature seeds.

Conclusion : ABSOLUTELY UNFIT AS SEED .

Dr.S.K.Banerjee 21/8/86
Seed Technologist,
Seed Project, Sennar.

Mr. Mohd. El Hassan Osman
Director, S.C.A., Sennar

21 August,1986

A8-6

CERTIFIED SEED

CERTIFIED FOR GENETIC IDENTITY ONLY

TEXAS

Tropical Seed Company, Inc. LH-26
P. O. Box 2[illegible] Harlingen, Texas
HYBRID SORGHUM Hageen Dura I
Net Weight 50 Kilos

C 1209064

Texas Department of Agriculture SEED PROGRAM

VENDOR'S STATEMENT OF ANALYSIS
TROPICAL SEED COMPANY, INC.
HARLINGEN, TEXAS 78552
Kind: HYBRID SORGHUM
Variety: HAGEEN DURA I
Lot No.: 1 Grown In TEXAS

Pure Seed: 98.00% Inert: 1.00%
Other Crop Seed: .01% Weed Seed: .00%
Noxious Weed Seed Per Lb.: NONE
Germination: 80% Tested MARCH 1986
Net Weight 50 Kilos W/O 860522

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H4

TROPICAL SEED CO., INC.

March 15, 1986

15 March 1986

SEED GROWERS CERTIFICATE

Ref: A.I.D. Letter of Commitment No. 650-K-0681 Dated 1 Nov. 1985
Request for Quotation No. NOA/85-07/DRS, as Amended
Tropical Seed Telex Offer dated August 16, 1985
Notice of Award dated August 23, 1985

HAGREN DURA I - HYBRID SORGHUM SEED

A. The seed was grown in U.S.A.

B. The seed was sampled by an official of, and tested in, a laboratory of Texas.

C. The seed was put up in packages of containers used by end-users, labeled with all of the following:

(1) Seed lot number:
(2) Kind, or kind and variety:
(3) Weed seeds:
(4) Inert matter:
(5) Germination and hard seed:
(6) Names and rates of noxious weed-seed occurrence;
(7) Month/year in which purity and germination tests were completed;

D. Not more than twelve (12) calendar months have elapsed since last day of month when germination test was completed (when seed is packaged in hermetically sealed containers).

E. Samples of the shipping lot will be retained for one year by Tropical Seed Co., Inc. and a copy of the laboratory purity and germination test analysis will be retained by the laboratory for not less than three (3) years.

TROPICAL SEED CO., INC.

BY: Robert L. Henry
ROBERT L. HENRY, PRESIDENT

Attachment: Texas Dept. of Agriculture
Laboratory analysis

TROPICAL SEED CO., INC.
ROUTE 3, BOX 231
HARLINGEN, TEXAS 78552
PHONE 512/423-3726

March 20, 1986

Embassy of the Democratic Republic of Sudan
Office of the Economic Counselor
2210 Massachusetts Ave., N. W.
Washington, D. C. 20008

Re: A.I.D. Letter of Commitment No. 650-K606B19
Request for Quotation No. MOA/85-01/DRS, as amended, Notice of Award dated August 23, 1985

Gentlemen:

I hereby report that we have a reduced tonnage under the above referred to contract due to an act of God to-wit: freezing temperatures and not because of any fault on my part.

The U. S. Bureau of Weather document attached hereto verified the temperatures for the date shown and was an act of God or force majure; therefor, I feel relief of any further commitment as to the tonnage.

The shortage was approximately 48 metric tons. Please refer to Article H of the original Telex dated August 6, 1985 as amended by Telex dated August 16, 1985, Article H.

Sincerely yours,

Robert L. Hensz

ROBERT L. HENSZ
President

cc: Commodity Aid Committee
Ministry of Agriculture
Controller, USAID/Khartoum
United States International Development Cooperation Agency

DATE MILL | MONTICELLO | 1X | DEC. 85 | (Local time) 7:45 AM | C.S.T.

DATE	AIR TEMPERATURE °F: 24 Hours Ending at Observation: Max.	Min.	At Observation: Dry-bulb	Wet-bulb	Dew Point	Supplemental Readings at 4" SAL TEMP: ~~Dry-bulb~~	~~Wet-bulb~~	Dew Point	PRECIPITATION: Time of beginning	Time of ending	Time of beginning	Time of ending	24 Hour Amounts: Rain, Melted snow, etc. (in. & hundredths)	Snow, Ice Pellets, Hail (in. & tenths)	At Obsn: Snow, Ice Pellets, Hail, Ice on ground (in.)	WIND: Anemometer Dial Reading (Miles)	24 Hour Movement	EVAPORATION (Inches & hundredths): Gage Reading or Amount Added +	Reading when Tank Filled or Amount Removed −	Amount of Evaporation	TEMP. °F 24 Hours Ending at Observation: Max.	Min.	ADDITIONAL DATA/REMARKS
																801		3.27					
	87	67	72	72		87	67						0			1008	207	2.98		.29	87	60	
	77	41	41	40		80	52						0			1192	184	2.61		.37	78	47	
	55	40	47	43		66	52						0			1311	119	2.46		.15	57	37	
	62	47	57	55		69	51						.0			1402	91	2.35		.11	62	39	
	77	52	53	53		82	57						0			1479	77	2.23	3.13	.12	79	47	
	68	38	41	40		74	52						0			1552	73	2.96		.17	77	40	
	72	39	49	49		81	52						0			1612	60	2.75		.21	73	40	
	82	48	63	61		83	52						0			1670	58	2.62		.13	78	45	
	86	63	67	65		87	62						0			1773	103	2.43		.19	82	54	
	86	71	75	72		84	65						0			1945	172	2.25		.18	84	56	
	87	75	75	73		85	72						0			2145	200	2.05		.20	85	65	
	80	43	43	43		83	52						0			2314	169	1.90	2.63	.15	80	40	
	44	40	40	40		54	49						.18			2427	113	2.81		0	50	35	
	54	29	30	30		61	46						0			2542	115	2.70		.11	61	31	
	52	29	37	37		63	44						0			2585	43	2.56		.14	58	30	
	65	37	46	46		68	45						.0			2591	60	2.51		.05	56	30	
	70	45	53	52		74	46						.02			2633	42	2.43		.10	70	30	
	55	48	49	49		57	52						.31			2764	131	2.74		0	59	43	
	60	41	42	42		58	49						.T			2868	104	2.67		.07	60	38	
	65	40	55	53		70	48						0			2936	68	2.61	3.27	.06	64	38	
	64	52	57	56		63	54						.03			3012	76	3.29		.01	62	45	
	66	55	57	57		64	57						T			3071	59	3.25		.04	67	48	
	70	58	61	61		70	59						0			3126	55	3.24		.01	70	51	
	75	50	53	53		80	55						0			3181	55	3.12		.12	79	48	
	65	38	40	40		67	48						0			3248	67	3.00		.12	66	40	
	63	38	48	46		68	48						0			3358	110	2.86		.14	66	37	
	70	47	56	56		67	49						.01			3482	124	2.85		.02	67	41	LT. FOG
	78	54	58	58		82	58						0			3563	81	2.72	3.19	.13	80	52	HEAVY FOG
	63	50	58	57		62	59						0			3633	70	3.64		.05	67	52	
	70	57	61	61		70	59						0			3701	68	3.57		.07	69	57	
	81	59	59	59		83	60						0			3798	97	3.42		.15	80	54	PATCHY FOG
Sum	2147	1447											.55							3.61			
Avg.	69.3	48.9										Greatest	.31					Adjusted Total					

FORM E-22 (-701)

U.S. DEPARTMENT OF COMMERCE NOAA NATIONAL WEATHER SERVICE

OBSERVER N. ROZEFF, H. GALVAN

STATION NUMBER 21-00-9

IMPORTER'S NAME & ADDRESS MINISTRY OF AGRICULTURE

SUPPLIER'S NAME & ADDRESS TROPICAL SEED COMPANY

L/COM. NO. 650-K-606B-19 DATE _____ AMOUNT ($) _____

COMMODITY	SHIPPED						VALUE ($)
	VESSEL			BILL OF LADING			
	NAME	PORT OF LOADING	DATE OF ARRIVAL	NO.	DATE	QUANTITY	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sorghum Seeds	Sam Houston	Houston	7/5/86	19	3/27/86	153 Pacts (3055 bags)	180,162.32
			7 May 86				
		Date ship arrived in Port	See 8				

1-11-1

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N 4

ACCOUNTING 243

(S) _____ L/C NO. _____ DATE _____ AMOUNT (S

NTITY	VALUE ($)		OFF LOADED		OUT-TURN RECEIPT			[illegible]	
			QUANTITY	DATE	QUANTITY	DATE	AREA	QUANTITY	DATE
7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)	(15)
Pallets	180,162	32	153 pallets	4/6/86	153 pallets	10/6/86	D/D	153 pallets	14 1986
5 bags)			3055 bags	4 June	3055 bags			3055	
						10 June			
			unloaded from ship						

2 4 3

ATTACHMENT A

DATE ______ AMOUNT ($) ______ BANK ______

...ATE	OUT-TURN RECEIPT			RECEIVED BY IMPORTER				
	QUANTITY	DATE	AREA	QUANTITY	DATE	VALUE ($)	QUANTITY	VALUE ($)
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	( )
.../86	153 plts	10/6/86	D/D	153 plts	4/6/86	—	NILL	—
	3055 bags			3055	✓			
		10 June			4 June			

received from Port Sudan Register of receipt

APPENDIX "B"

Weather Data from Brownsville and Weslaco

in the Rio Grande Valley of Texas

SEP 1985
BROWNSVILLE, TEXAS
NATL WEA SER OFC
INTERNATIONAL AIRPORT

ISSN 0194-4150

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

INTERNATIONAL AIRPORT

LATITUDE 25°54' LONGITUDE 97°26' ELEVATION (GROUND) 19 FEET TIME ZONE CENTRAL 12919

DATE 1	TEMPERATURE °F MAXIMUM 2	MINIMUM 3	AVERAGE 4	DEPARTURE FROM NORMAL 5	AVERAGE DEW POINT 6	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JULY) 7A	COOLING (SEASON BEGINS WITH JAN) 7B	WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW 8	SNOW, ICE PELLETS OR ICE ON GROUND AT 0600 (INCHES) 9	PRECIPITATION WATER EQUIVALENT (INCHES) 10	SNOW, ICE PELLETS (INCHES) 11	AVERAGE STATION PRESSURE IN INCHES ELEV 20 FEET ABOVE M.S.L. 12	WIND (M.P.H.) RESULTANT DIR 13	RESULTANT SPEED 14	AVERAGE SPEED 15	FASTEST MILE SPEED 16	FASTEST MILE DIRECTION 17	SUNSHINE MINUTES 18	PERCENT OF TOTAL POSSIBLE 19	SKY COVER (TENTHS) SUNRISE TO SUNSET 20	MIDNIGHT TO MIDNIGHT 21	DATE 22
01	94	74	84	1	74	0	19		0	0.00	0.0	29.920	11	7.2	7.9	16	11	759	100	2	1	01
02	96*	73	85	2	73	0	20		0	0.00	0.0	29.86	16	7.7	9.1	16	15	758	100	1	1	02
03	93	77	85	2	74	0	20		0	0.00	0.0	29.85	15	15.8	16.1	25	15	703	93	2	1	03
04	94	80	87	4	76	0	22		0	0.00	0.0	29.9[illegible]	15	[illegible]	16.9	22	15	684	91	3	2	04
05	93	81	87*	4	76	0	22		0	0.00	0.0	29.86	15	19.3	19.6	30	15	734	97	3	2	05
06	93	79	86	3	75	0	21		0	T	0.0	29.940	15	16.1	16.4	22	16	746	99	3	2	06
07	93	77	85	2	74	0	20		0	0.00	0.0	30.015	15	12.8	13.3	21	18	711	95	2	1	07
08	95	74	85	2	73	0	20		0	0.00	0.0	30.000	13	8.6	9.5	16	10	692	92	5	3	08
09	88	75	82	0	75	0	17	3	0	1.26	0.0	29.925	12	5.2	7.3	18	10	320	43	5	3	09
10	92	75	84	2	74	0	19		0	0.00	0.0	29.880	12	6.6	7.0	16	11	689	92	7	4	10
11	92	74	83	1	74	0	18		0	0.01	0.0	29.890	13	9.4	9.1	16	14	676	91	5	3	11
12	93	74	84	2	74	0	19		0	T	0.0	29.940	10	6.9	8.3	15	11	558	75	7	5	12
13	91	76	84	2	74	0	19	3	0	0.01	0.0	30.010	05	6.8	8.0	16	06	591	80	7	5	13
14	91	73	82	0	74	0	17	8	0	0.00	0.0	30.050	04	7.9	8.9	16	03	579	79	3	2	14
15	89	73	81	-1	74	0	16	1 3 8	0	0.93	0.0	29.990	25	6.5	9.4	21	02	380	51	8	7	15
16	79	73	76	-5	74	0	11	1	0	0.70	0.0	29.925	05	3.9	6.4	10	07	21	3	10	9	16
17	88	72	80	-1	75	0	15	3	0	0.13	0.0	29.680	11	4.7	6.6	16	11	466	63	8	5	17
18	89	76	83	2	76	0	18		0	0.02	0.0	29.950	12	9.2	10.0	20	13	546	74	6	4	18
19	89	74	82	1	74	0	17		0	0.00	0.0	29.970	03	9.0	9.3	18	10	672	92	3	2	19
20	89	73	81	0	72	0	16		0	0.00	0.0	29.940	16	7.6	8.4	16	09	641	88	3	3	20
21	88	69	79	-2	72	0	14		0	0.04	0.0	29.870	04	3.5	6.1	14	16	493	68	4	2	21
22	92	71	82	1	72	0	17		0	0.00	0.0	29.800	12	3.4	5.8	14	13	674	93	3	2	22
23	93	75	84	4	74	0	19		0	0.00	0.0	29.870	15	2.8	3.3	16	17	683	94	0	1	23
24	90	74	82	2	73	0	17		0	T	0.0	29.960	03	4.1	6.9	14	07	538	74	5	3	24
25	91	73	82	2	73	0	17		0	0.00	0.0	29.830	16	7.4	8.1	16	15	619	85	2	1	25
26	86	71	79	-1	71	0	14		0	T	0.0	29.915	01	8.6	10.8	18	36	426	59	8	5	26
27	87	68	78	-2	71	0	13	3	0	0.08	0.0	29.930	08	4.7	8.4	16	12	396	55	8	5	27
28	89	73	81	2	74	0	16		0	0.04	0.0	29.910	15	10.9	11.4	23	14	500	70	4	4	28
29	91	78	85	6	74	0	20	3	0	0.00	0.0	29.850	16	15.5	15.9	25	16	560	78	2	2	29
30	80	59*	70*	-9	61	0	5	3	0	2.82	0.0	30.020	35	13.9	14.9	24	32	1	0	10	10	30
SUM	2708	2214				TOTAL 0	TOTAL 519		TOTAL	6.04	TOTAL 0.0	FOR THE MONTH: 29.920	13	6.3	10.2	30	15	TOTAL 16815	% POSS 139	SUM	SUM
AVG.	90.3	AVG. 73.8	AVG. 82.1	DEP. 0.7	AVG. 73.8	DEP. 0	DEP. 26	NUMBER OF DAYS PRECIPITATION ≥ .01 INCH 11	DEP. 0.80							DATE: 5		POSSIBLE 22140	MONTH 76	AVG. 4.6	AVG. 3.8

NUMBER OF DAYS				SEASON TO DATE TOTAL	TOTAL
MAXIMUM TEMP. ≥ 90°	MAXIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 0°	0	3371
18	0	0	0	DEP. 0	DEP. 123

NUMBER OF DAYS	
SNOW, ICE PELLETS ≥ 1.0 INCH	0
THUNDERSTORMS	5
HEAVY FOG	0
CLEAR 14 PARTLY CLOUDY 10 CLOUDY 6	

GREATEST IN 24 HOURS AND DATES		
	PRECIPITATION	SNOW, ICE PELLETS
	3.82	30

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
0

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE
T TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. ONE OF THREE WIND SPEEDS IS GIVEN UNDER FASTEST MILE: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED (AS APPEARS IN THE DIRECTION COLUMN). ERRORS WILL BE CORRECTED AND NOTED IN SUBSEQUENT PUBLICATIONS.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

Kenneth D. Wadlow
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA

SEP 1985
BROWNSVILLE, TEXAS

54

OCT 1985
BROWNSVILLE, TEXAS
NAT'L WEA SER OFC
INTERNATIONAL AIRPORT

ISSN 0198-4950

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

INTERNATIONAL AIRPORT

LATITUDE 25°54' LONGITUDE 97°26' ELEVATION (GROUND) 19 FEET TIME ZONE CENTRAL 1299

DATE 1	TEMPERATURE °F MAXIMUM 2	MINIMUM 3	AVERAGE 4	DEPARTURE FROM NORMAL 5	AVERAGE DEW POINT 6	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JUL) 7A	COOLING (SEASON BEGINS WITH JAN) 7B	WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW 8	SNOW, ICE PELLETS, ICE ON GROUND AT 0600 (INCHES) 9	PRECIPITATION WATER EQUIVALENT (INCHES) 10	SNOW, ICE PELLETS (INCHES) 11	AVERAGE STATION PRESSURE IN INCHES ELEV 20 FEET ABOVE M.S.L. 12	WIND (M.P.H.) RESULTANT DIR 13	RESULTANT SPEED 14	AVERAGE SPEED 15	FASTEST MILE SPEED 16	FASTEST MILE DIRECTION 17	SUNSHINE MINUTES 18	PERCENT OF TOTAL POSSIBLE 19	SKY COVER (TENTHS) SUNRISE TO SUNSET 20	MIDNIGHT TO MIDNIGHT 21	24 DATA 22
01	73	55	64*	-15	55	1	0		0	0.00	0.0	30.050	34	10.7	12.2	17	33	688	96	0	3	07
02	82	58	70	-9	62	0	5		0	0.00	0.0	30.010	35	6.8	8.0	12	05	577	81	2	1	[illegible]
03	85	65	75	-3	67	0	10	1	0	0.00	0.0	[illegible]	[illegible]	4.7	6.8	13	06	525	74	5	[illegible]	[illegible]
04	90	66	78	0	69	0	13	1	0	0.00	0.0	30.030	01	3.6	5.0	13	08	664	94	0	0	[illegible]
05	78	59	69	-9	56	0	4		0	0.00	0.0	30.200	35	11.4	11.7	17	33	582	82	4	4	05
06	82	56	69	-9	58	0	4		0	0.00	0.0	30.050	07	3.5	6.7	12	12	707	100	0	0	06
07	86	66	76	-1	67	0	11		0	0.00	0.0	29.920	13	9.5	10.0	18	14	489	69	4	[illegible]	[illegible]
08	90	74	82	5	74	0	17		0	0.00	0.0	29.890	14	14.6	15.0	24	16	471	67	8	5	[illegible]
09	89	78	84	7	76	0	19		0	0.00	0.0	29.950	14	15.6	15.8	23	13	439	62	6	4	[illegible]
10	90	77	84	7	75	0	19		0	0.00	0.0	29.950	13	12.4	12.6	20	13	624	89	2	[illegible]	[illegible]
11	86	73	81	4	72	0	16		0	T	0.0	29.920	15	9.4	10.4	17	15	488	70	5	3	[illegible]
12	91*	73	82	6	74	0	17		0	0.00	0.0	29.890	14	10.3	10.6	18	15	558	80	3	2	[illegible]
13	90	76	83	7	75	0	18		0	0.00	0.0	29.860	15	13.1	13.2	21	15	506	73	3	2	[illegible]
14	90	77	84*	8	76	0	19		0	0.00	0.0	29.840	15	14.6	14.7	23	15	476	68	5	3	[illegible]
15	82	70	76	0	72	0	11		0	1.27	0.0	29.975	05	6.0	9.2	23	02	128	18	10	8	[illegible]
16	84	72	78	3	72	0	13		0	0.16	0.0	30.025	02	7.6	8.0	17	02	92	13	9	6	[illegible]
17	88	71	80	5	74	0	15	1	0	0.00	0.0	29.960	14	9.9	10.7	18	18	510	74	3	2	[illegible]
18	89	77	83	8	75	0	18		0	T	0.0	29.960	15	13.5	13.8	23	14	438	63	7	4	[illegible]
19	89	75	82	7	75	0	17		0	0.00	0.0	29.950	12	8.9	9.7	15	15	473	69	9	6	[illegible]
20	84	72	78	4	74	0	13	1 3	0	0.50	0.0	29.930	02	3.8	5.5	10	36	88	13	10	6	[illegible]
21	87	72	80	6	73	0	15	2	0	1.29	0.0	29.930	33	2.8	4.8	17	11	220	32	9	8	[illegible]
22	82	72	77	3	73	0	12	1 3	0	0.34	0.0	29.910	05	1.3	4.5	12	14	89	13	9	7	[illegible]
23	89	70	80	6	73	0	15	1	0	T	0.0	29.890	14	6.0	6.5	14	15	492	72	3	2	[illegible]
24	87	71	79	6	73	0	14	1	0	0.00	0.0	29.940	05	5.7	6.6	14	07	570	84	2	[illegible]	24
25	84	69	77	4	71	0	12	3	0	0.48	0.0	29.940	36	7.7	8.6	17	36	317	47	5	3	25
26	83	68	76	3	67	0	11	1	0	0.00	0.0	29.950	35	11.6	11.9	21	35	538	79	3	2	[illegible]
27	83	64	74	1	62	0	9	1	0	0.00	0.0	29.890	34	14.0	14.2	23	34	567	84	1	[illegible]	[illegible]
28	84	60	72	0	52	0	7		0	0.00	0.0	29.750	30	14.1	14.5	25	30	628	93	2	[illegible]	[illegible]
29	86	59	73	1	54	0	8		0	0.00	0.0	29.710	31	12.9	13.5	23	31	674	100	0	[illegible]	[illegible]
30	79	60	70	-2	53	0	5		0	0.00	0.0	29.730	31	13.8	14.2	24	31	493	73	3	3	[illegible]
31	82	53*	68	-3	52	0	3		0	0.00	0.0	[illegible]	[illegible]	3.5	7.1	12	33	672	100	0	[illegible]	[illegible]
SUM	SUM					TOTAL	TOTAL		TOTAL	TOTAL								TOTAL	%			
2646	2108					1	370	NUMBER OF DAYS	4	[illegible]				FOR THE MONTH				14793	POSS			
AVG	AVG	AVG	DEP	AVG		DEP	DEP	PRECIPITATION	DEP													
85.4	68.0	76.7	1.4	67.7		1	48	> .01 INCH 6	0.50								DATE 28	POSSIBLE	MONTH	AVG		
																		21420	69	4		0

NUMBER OF DAYS				SEASON TO DATE		SNOW, ICE PELLETS		GREATEST IN 24 HOURS AND DATES		GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL	> 1.0 INCH	0			
> 90°	≤ 32°	≤ 32°	≤ 0°	1	3741	THUNDERSTORMS	3	PRECIPITATION	SNOW, ICE PELLETS	0
DEP		DEP		DEP	DEP	HEAVY FOG	1	[illegible]	[illegible]	
6	0	0	0	1	171	CLEAR 16 PARTLY CLOUDY 6 CLOUDY 9				

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE
T TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. ONE OF THREE WIND SPEEDS IS GIVEN UNDER FASTEST MILE: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED (AT APPEARS IN THE DIRECTION COLUMN). ERRORS WILL BE CORRECTED AND NOTED IN SUBSEQUENT PUBLICATIONS.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA

Kenneth D. Wade

DIRECTOR
NATIONAL CLIMATIC DATA CENTER

OCT 1985
BROWNSVILLE, TEXAS

NOV 1985
BROWNSVILLE, TEXAS
NAT'L WEA SER OFC
INTERNATIONAL AIRPORT

ISSN 0196-[illegible]

LOCAL CLIMATOLOGICAL DATA
Monthly Summary

INTERNATIONAL AIRPORT

LATITUDE 25°54' LONGITUDE 97°26' ELEVATION (GROUND) 19 FEET TIME ZONE CENTRAL 12919

DATE 1	TEMPERATURE °F: MAXIMUM 2	MINIMUM 3	AVERAGE 4	DEPARTURE FROM NORMAL 5	AVERAGE DEW POINT 6	DEGREE DAYS BASE 65°F: HEATING (SEASON BEGINS WITH JUL) 7A	COOLING (SEASON BEGINS WITH JAN) 7B	WEATHER TYPES (1 FOG, 2 HEAVY FOG, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW) 8	SNOW, ICE PELLETS OR ICE ON GROUND AT 06 (INCHES) 9	PRECIPITATION: WATER EQUIVALENT (INCHES) 10	SNOW, ICE PELLETS (INCHES) 11	AVERAGE STATION PRESSURE (IN INCHES ELEV 20 FEET ABOVE M.S.L.) 12	WIND (M.P.H.): RESULTANT DIR 13	RESULTANT SPEED 14	AVERAGE SPEED 15	FASTEST MILE: SPEED 16	DIRECTION 17	SUNSHINE: MINUTES 18	PERCENT OF TOTAL POSSIBLE 19	SKY COVER (TENTHS): SUNRISE TO SUNSET 20	MIDNIGHT TO MIDNIGHT 21	[illegible] 22
01	85	63	74	3	68	0	9	3	0	0.19	0.0	29.51[illegible]	[illegible]	3.7	12.0	20	31	126	19	9	[illegible]	[illegible]
02	67	51	59*	-12	52	6	0		0	T	0.0	29.94[illegible]	32	14.3	14.5	21	32	227	35	9	6	[illegible]
03	72	48	60	-11	44	5	0		0	[illegible]	[illegible]	[illegible]	[illegible]	6.4	7.3	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
04	79	45*	62	-8	45	3	0		0	0.00	0.0	30.1[illegible]	[illegible]	3.5	5.9	9	29	666	100	[illegible]	[illegible]	[illegible]
05	81	47	64	-6	49	1	0		0	0.00	0.0	30.06[illegible]	19	2.2	4.6	10	16	665	100	0	0	05
06	82	55	69	-1	60	0	4		0	0.00	0.0	29.91[illegible]	13	9.4	9.8	18	18	664	100	1	0	06
07	86	58	72	2	65	0	7	2	0	0.00	0.0	29.96[illegible]	14	4.7	5.9	13	18	514	78	3	1	07
08	84	64	74	5	66	0	9	2	0	0.00	0.0	30.0[illegible]	15	12.9	13.2	24	15	435	66	3	3	08
09	84	71	78	9	69	0	13		0	0.00	0.0	29.92[illegible]	15	16.6	16.8	24	16	342	52	4	3	09
10	86	74	80	11	73	0	15		0	0.00	0.0	29.95[illegible]	[illegible]	14.9	15.2	22	16	274	42	6	[illegible]	[illegible]
11	86	77	82*	13	75	0	17		0	0.00	0.0	29.97[illegible]	15	17.7	17.8	26	17	114	17	8	9	11
12	87	75	81	13	72	0	16		0	0.00	0.0	29.95[illegible]	[illegible]	15.4	15.5	22	16	529	81	2	2	12
13	86	74	80	12	72	0	15		0	0.00	0.0	29.9[illegible]	15	13.2	13.6	21	16	345	53	8	5	13
14	87	72	80	12	71	0	15		0	0.00	0.0	29.94[illegible]	[illegible]	17.0	17.2	26	17	426	65	9	6	[illegible]
15	87*	71	79	11	71	0	14		0	0.00	0.0	29.96[illegible]	14	11.1	11.4	20	15	427	65	3	2	15
16	74	63	69	2	64	0	4	1	0	T	0.0	30.05[illegible]	34	8.6	8.9	13	34	20	3	10	10	16
17	85	62	74	7	68	0	9	2	0	0.01	0.0	29.95[illegible]	15	8.7	12.3	22	16	171	26	8	6	17
18	85	75	80	13	71	0	15		0	0.00	0.0	29.93[illegible]	15	16.5	18.7	25	17	357	55	7	4	18
19	86	71	79	12	70	0	14		0	0.00	0.0	29.97[illegible]	[illegible]	13.2	13.9	23	17	409	63	7	3	19
20	73	54	64	-3	56	1	0	1	0	0.11	0.0	30.13[illegible]	34	10.4	11.5	16	33	0	0	10	9	20
21	69	51	60	-6	49	5	0		0	0.00	0.0	30.05[illegible]	31	9.3	9.2	14	32	207	32	8	7	21
22	79	54	67	1	63	0	2	1	0	T	0.0	30.01[illegible]	34	5.0	7.8	13	06	295	46	7	6	22
23	86	72	79	13	73	0	14	1	0	0.01	0.0	29.97[illegible]	[illegible]	13.0	[illegible]	[illegible]	15	184	29	6	7	23
24	84	71	78	12	73	0	13		0	T	0.0	29.95[illegible]	[illegible]	12.5	12.7	21	16	192	30	5	4	24
25	84	73	79	13	73	0	14		0	T	0.0	29.92[illegible]	15	14.4	14.5	22	16	216	34	7	4	25
26	85	74	80	15	72	0	15		0	0.00	0.0	29.86[illegible]	15	16.2	16.4	25	17	276	43	9	6	26
27	83	64	74	9	70	0	9	3	0	0.69	0.0	29.83[illegible]	[illegible]	1.4	10.5	24	35	49	8	10	10	[illegible]
28	77	63	70	5	66	0	5		0	0.00	0.0	29.55[illegible]	[illegible]	7.9	9.1	14	03	58	9	10	10	[illegible]
29	84	63	74	9	68	0	9	1 8	0	0.01	0.0	29.83[illegible]	[illegible]	2.6	7.7	15	19	243	39	7	5	29
30	85	68	77	12	71	0	12		0	0.00	0.0	29.74[illegible]	[illegible]	14.8	15.4	32	17	500	78	2	1	30
SUM	SUM					TOTAL	TOTAL	NUMBER OF DAYS		TOTAL	TOTAL	FOR THE MONTH						TOTAL	S	SUM	S	M
2458	1523					[illegible]	[illegible]			[illegible]	[illegible]								FOG	HD		
AVG	AVG	AVG	DEP	AVG		DEP	DEP	PRECIPITATION		DEP												
81.9	64.1	73.0	5.2	65.2		-3.4	[illegible]	≥ .01 INCH	6	-2.42								PSBL	POSSIBLE	AVG	AVG	

NUMBER OF DAYS: MAXIMUM TEMP. ≥ 90°	≤ 32°	MINIMUM TEMP. ≤ 32°	≤ 0°	SEASON TO DATE: TOTAL	TOTAL	NUMBER OF DAYS: ≥ 1.0 INCH	THUNDERSTORMS	HEAVY FOG	GREATEST IN 24 HOURS AND DATE: PRECIPITATION		SNOW, ICE PELLETS		GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
0	0	0	0	DEP	DEP								0
				[illegible]	[illegible]	YEAR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA

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DIRECTOR
NATIONAL CLIMATIC DATA CENTER

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INTERNATIONAL AIRPORT

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LOCAL CLIMATOLOGICAL DATA
Monthly Summary

INTERNATIONAL AIRPORT

LATITUDE 25°54' LONGITUDE 97°26' ELEVATION (GROUND) 19 FEET TIME ZONE CENTRAL 12919

DATE 1	TEMPERATURE °F MAXIMUM 2	MINIMUM 3	AVERAGE 4	DEPARTURE FROM NORMAL 5	AVERAGE DEW POINT 6	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JULY) 7A	COOLING (SEASON BEGINS WITH JAN) 7B	WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW 8	SNOW ICE PELLETS OR ICE ON GROUND AT 0600 INCHES 9	PRECIPITATION WATER EQUIVALENT (INCHES) 10	SNOW, ICE PELLETS (INCHES) 11	AVERAGE STATION PRESSURE IN INCHES ELEV 20 FEET ABOVE M S L 12	WIND (M P H) RESULTANT DIR 13	RESULTANT SPEED 14	AVERAGE SPEED 15	FASTEST MILE SPEED 16	FASTEST MILE DIRECTION 17	SUNSHINE MINUTES 18	PERCENT OF TOTAL POSSIBLE 19	SKY COVER (TENTHS) SUNRISE TO SUNSET 20	MIDNIGHT TO MIDNIGHT 21	DATE 22
01	79	52	66	2	61	0	1	1 8	0	0.00	0.0	29.935	35	7.2	13.2	23	36	305	49	6	4	01
02	52	44	48	-16	38	17	0		0	0.00	0.0	30.295	33	5.1	15.4	20	32	2	0	10	9	02
03	66	48	57	-7	44	8	0		0	0.00	0.0	30.160	[illegible]	9.2	10.4	16	34	125	20	7	6	03
04	77	55	66	2	54	0	1		0	0.00	0.0	30.120	35	7.1	8.4	14	04	152	24	8	8	04
05	64	48	56	-8	51	9	0		0	0.00	0.0	30.280	35	10.8	11.5	18	01	222	36	6	3	05
06	72	42	57	-7	45	8	0		0	0.00	0.0	30.235	36	4.3	6.4	12	07	601	95	1	0	06
07	79	47	63	0	55	2	0		0	0.00	0.0	30.070	15	5.1	6.7	17	15	501	79	1	2	07
08	81	54	68	5	61	0	3	2	0	0.00	0.0	30.000	15	7.3	7.9	16	14	510	80	5	4	08
09	83	66	75	12	67	0	10		0	0.00	0.0	29.940	15	3.5	13.7	26	16	227	36	10	6	09
10	84	72	78*	15	72	0	13		0	0.00	0.0	29.910	15	8.4	18.5	29	16	95	15	9	9	10
11	83	46	65	2	59	0	0		0	T	0.0	29.985	30	3.0	14.5	23	32	42	7	10	8	11
12	47	42	45	-18	43	20	0	1	0	0.01	0.0	30.020	33	2.4	12.7	18	34	0	0	10	10	12
13	56	40	48	-15	37	17	0	1	0	T	0.0	30.240	35	2.8	13.5	18	35	577	91	3	4	13
14	52	30*	41*	-21	30	24	0		0	0.00	0.0	30.490	34	8.5	9.1	13	33	496	78	8	5	14
15	68	37	53	-9	44	12	0		0	0.00	0.0	30.280	31	5.0	5.3	9	35	233	37	9	6	15
16	72	42	57	-5	50	8	0	2	0	0.00	0.0	30.220	35	6.2	6.9	13	05	209	33	7	7	16
17	62	50	56	-6	52	9	0	1	0	0.28	0.0	30.170	32	1.7	11.9	21	33	0	0	10	10	17
18	58	49	54	-8	47	11	0	1	0	0.07	0.0	30.250	33	2.0	12.5	18	33	0	0	10	8	18
19	68	48	58	-4	51	7	0	1	0	0.00	0.0	30.335	35	9.1	9.2	13	35	245	39	10	7	19
20	65	51	58	-4	57	7	0	1	0	0.03	0.0	30.270	01	5.5	5.8	10	03	0	0	10	8	20
21	70	60	65	3	60	0	0	1	0	T	0.0	30.290	03	5.8	6.2	14	05	0	0	10	10	21
22	68	60	64	3	61	1	0	1	0	0.03	0.0	30.140	17	3.6	4.3	12	17	0	0	10	10	22
23	73	52	63	2	58	2	0	2 8	0	T	0.0	30.010	33	3.8	6.3	14	31	207	33	7	5	23
24	73	47	60	-1	50	5	0	2 8	0	0.00	0.0	30.040	36	5.8	6.2	19	35	208	33	7	6	24
25	67	43	55	-6	44	10	0		0	0.00	0.0	30.335	02	8.3	9.5	17	04	474	75	2	1	25
26	69	50	60	-1	57	5	0		0	T	0.0	30.200	15	9.1	10.4	18	16	22	3	10	8	26
27	78	62	70	9	63	0	5		0	0.00	0.0	30.050	19	10.6	12.2	23	20	309	49	6	5	27
28	67	58	63	2	59	2	0	2	0	0.00	0.0	30.090	35	7.5	7.6	10	36	0	0	10	10	28
29	72	58	65	4	60	0	0	1	0	0.00	0.0	30.090	35	7.7	8.3	13	02	39	6	10	9	29
30	80	58	69	8	63	0	4	2	0	0.00	0.0	30.000	18	5.4	6.1	17	18	299	47	5	6	30
31	89*	60	75	14	62	0	10	2	0	0.00	0.0	29.920	33	[illegible]	9.2	20	02	573	91	[illegible]	[illegible]	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL							TOTAL	%			
	2174	1571				184	47	NUMBER OF DAYS		0.42	0.0	30.140	[illegible]	[illegible]	[illegible]	29	16	[illegible]	[illegible]	[illegible]		
	AVG	AVG	AVG	DEP	AVG	DEP	DEP	PRECIPITATION		DEP												
	70.1	50.7	60.4	-1.9	53.3	34	-19	≥ .01 INCH	5	-0.74												

NUMBER OF DAYS				SEASON TO DATE TOTAL	TOTAL	SNOW, ICE PELLETS		GREATEST IN 24 HOURS AND DATES			GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
MAXIMUM TEMP.		MINIMUM TEMP.				≥ 1.0 INCH	0	PRECIPITATION	SNOW, ICE PELLETS		
≥ 90°	≤ 32°	≤ 32°	≤ 0°	DEP	DEP	THUNDERSTORMS	0	[illegible] 35	17-18		0
0	0	1	0	1	285	HEAVY FOG 7					
						CLEAR 5	PARTLY CLOUDY 9	CLOUDY 17			

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. ONE OF THREE WIND SPEEDS IS GIVEN UNDER FASTEST MILE: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED (A / APPEARS IN THE DIRECTION COLUMN). ERRORS WILL BE CORRECTED AND NOTED IN SUBSEQUENT PUBLICATIONS.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

Kenneth D. Wadlan
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA

DEC 1985
BROWNSVILLE, TEXAS

FEB 11 1986

TEXAS AGRICULTURAL EXPERIMENT STATION
2415 East Hwy 83, Weslaco, Texas 78596

ıth of September, 1985; Readings taken 8 a.m.

:e	AIR TEMP °F Max.	Min.	Mean	Precipitation Amount Inches	Avg. Rel. Hum. %	Evaporation Amount Inches	WIND Miles	Direction	Characteristics of Day
	96	74	85.0		64.5	.19	59.0	SE	H.dew, ptly.cldy.
	97	73	85.0		63.5	.24	53.0	S	Dew, clear
	96	79	87.5		66.5	.27	86.0	SE	L.dew, clear
	97	77	87.0		69.0	.30	107.0	S	M.dew, ptly.cldy.
	97	79	88.0		70.0	.00	125.0	S	Clear
	96	79	87.5		67.0	.30	140.0	S	Ptly.cldy.
	97	78	87.5		64.5	.28	118.0	SE	M.dew, ptly.cldy.
	96	75	85.5		65.5	.27	98.0	SE	H.dew, ptly.cldy.
	93	75	84.0		74.5	.30	69.0	SE	H.dew, thunder, ptly.cldy.
	95	72	83.5	Trace	68.0	.13	64.0	SE	H.dew, ptly.cldy.
	94	76	85.0		69.5	.22	78.0	SE	M.dew, thunder, ptly.cldy.
	96	74	85.0		68.5	.20	70.0	SE	M.dew, thunder, cldy.
	90	74	82.0	.22	75.5	.18	75.5	SE	Rain, M.dew, cldy.
	92	74	83.0	.10	73.0	.10	35.0	S	L.fog, H.dew, cldy.
	87	73	80.0	.30	81.5	.13	53.0	NW	Rain, M.fog, dew, cldy.
	79	73	76.0	.41	97.5	.16	70.0	NE	Rain, cldy.
	87	72	79.5	.04	85.5	.06	35.0	NE	M.fog, H.dew, ptly.cldy.
	91	73	82.0		78.0	.13	59.0	SE	H.dew, ptly.cldy.
	90	74	82.0	.06	76.5	.12	69.0	SE	H.dew, clear
	91	74	82.5	.02	73.5	.15	59.0	E	Rain, L.dew, cldy.
	91	70	80.5	Trace	70.5	.19	46.0	NE	M.fog, H.dew, clear
	95	72	83.5		65.0	.17	37.0	S	H.dew, clear
	97	75	86.0		65.0	.20	56.0	SE	M.dew, clear
	96	75	85.5		70.0	.20	62.0	NE	M.dew, norther, clear
	95	72	83.5	.15	67.0	.18	51.0	SW	M.dew, clear
	83	70	76.5	.10	80.0	.21	75.0	N	Rain, cldy.
	93	66	79.5		70.0	.18	58.0	NW	L.dew, clear
	94	70	82.0		70.0	.00	72.0	SE	L.dew, ptly.cldy.
	93	76	84.5		69.0	.45	101.0	SE	Ptly.cldy.
	64	60	62.0	8.50	86.0	overflow	138.0	NW	Rain, thunder, cldy., norther
ı	2758	2204	24810	9.90	21645	5.51	22185		
.n	91.9	73.5	82.7		72.2				
ıar- 'e m mal	+0.3	+3.0	+1.5	+5.62	-3.4				
umu- ed de- ture ce . 1	-12.4	+9.0	-10.8	+3.59	-25.1				

PRECIPITATION TEMPERATURE NO. OF

imated effective 8.50 in.
atest in 24 hrs. 8.50 in.
hail - in.
sleet - in.
snow - in.
days with .01" or more 10

Highest 97° Date 9/02;04;05;
Lowest 60° Date 07;23 9/30
Date of last killing frost in the spring or first killing frost in the fall -
No. days with 32° or less -

Thunderstorms 4
Windstorms 10
Days: Clear 10
Ptly.Cldy. 12
Cloudy 8 Sleet -
Snow - Hail -

METEOROLOGICAL RECORD
TEXAS AGRICULTURAL EXPERIMENT STATION
2415 E. Hwy. 83, Weslaco, Texas 78596

nth of October, 1985; Readings taken 8 a.m

te	AIR TEMP °F Max.	Min.	Mean	Precipitation Amount Inches	Avg. Rel. Hum. %	Evaporation Amount Inches	WIND Miles	Direction	Characteristics of Day
1	73	55	64.0		69.0	*	80.0	[illegible]	Ptly.cldy.
2	80	56	68.0		74.5	.45	57.0	[illegible]	H.dew, ptly.cldy.
3	85	59	72.0		74.0	.12	42.0	N	L.fog, H.dew, ptly.cldy.
4	89	67	78.0		75.0	.11	41.0	SE	L.fog, H.dew, clear
5	76	65	70.5		65.0	.20	62.0	N	Norther, ptly.cldy.
6	83	57	70.0		68.0	.20	48.0	NE	H.dew, clear
7	86	60	73.0		73.5	.15	60.0	SE	H.dew, clear
8	90	69	79.5		74.5	.12	69.0	SE	M.dew, ptly.cldy.
9	91	75	83.0		73.0	.13	124.0	SE	M.dew, ptly.cldy.
0	91	76	83.5		71.0	.14	114.0	SE	L.fog, H.dew, ptly.cldy.
1	89	74	81.5		75.0	.18	90.0	E	H.dew, ptly.cldy.
2	92	72	82.0		74.0	.18	84.0	SE	H.dew, ptly.cldy.
3	90	74	82.0		73.0	.17	79.0	SE	H.dew, ptly.cldy.
4	93	77	85.0		70.0	.08	101.0	SE	H.dew, ptly.cldy.
5	80	76	78.0		87.0	.17	95.0	SE	H.dew, ptly.cldy.
6	82	68	75.0	0.34	88.5	.12	70.0	N	Rain, M.fog, H.dew, cldy.
7	88	69	78.5	0.02	80.0	.08	51.0	SE	Rain, H.dew, cldy.
8	89	73	81.0	Trace	75.0	.11	90.0	SE	Rain, H.dew, ptly.cldy.
9	88	76	82.0		80.5	.13	94.0	SE	L.fog, H.dew, ptly.cldy.
0	82	73	77.5	0.12	87.0	.10	63.0	N	Rain, M.fog, H.dew, norther,
	85	72	78.5	0.22	82.5	.08	46.0	N	L.fog, H.dew, cldy.
2	85	72	78.5	Trace	78.0	.08	32.0	N	Rain, cldy.
3	89	71	80.0	Trace	76.0	.05	27.0	SE	M.fog, H.dew, ptly.cldy.
4	89	71	80.0		74.5	.09	35.0	SE	H.fog, H.dew, cldy.
5	83	71	77.0		79.0	.12	47.0	NW	H.fog, H.dew, ptly.cldy.
6	84	68	76.0	0.28	73.5	.13	65.0	NW	M.fog, H.dew, ptly.cldy.
7	83	64	73.5		67.5	.16	78.0	NW	L.dew, clear
8	85	60	72.5		49.5	.26	105.0	NW	Clear
9	88	65	76.5		52.5	.28	120.0	NW	Clear
0	80	63	71.5		57.0	.30	106.0	NW	Clear
1	83	54	68.5		61.5	.23	111.0	W	Clear
n	2651	2102	23765	0.98	22590	4.75	22830		
an	85.5	67.8	76.7		72.9				
par-re om mal	- 1.3	+ 3.9	+2.7	-1.28	- 2.1				
cumu-ted de-ture ice n. 1	-13.7	+12.9	-8.10	+2.31	-27.2				

PRECIPITATION

timated effective -0- in.
eatest in 24 hrs. 0.34 in.
hail - in.
sleet - in.
snow - in.
. days with .01" or more 5

TEMPERATURE

Highest 93° Date 10-14-85
Lowest 54° Date 10-31-85
Date of last killing frost in the spring or first killing frost in the fall -
No. days with 32° or less -

NO. OF

Thunderstorms -0-
Windstorms 1
Days: Clear [illegible]
Ptly. Cldy. [illegible]
Cloudy 6 Sleet -
Snow - Hail -

Reading not taken

- 9

TEXAS AGRICULTURAL EXPERIMENT STATION
2415 E. Hwy. 83, Weslaco, Texas 78596

th of November, 1985; Readings taken 8 a.m.

e	AIR TEMP °F Max.	Min.	Mean	Precipitation Amount Inches	Avg. Rel. Hum. %	Evaporation Amount Inches	WIND Miles	Direction	Characteristics of Day
	90	63	7[illegible].5		66.0	.11	42.0	SE	M.dew, cldy.
	66	56	61.0		74.5	.22	135.0	NW	Norther, cldy.
	73	48	60.5		57.0	.20	84.0	NW	M.dew, clear
	79	46	62.5		52.5	.16	29.0	SW	L.dew, clear
	81	49	65.0		58.0	.15	21.0	N	L.dew, clear
	85	54	69.5		64.0	*	22.0	S	M.dew, clear
	86	62	74.0		68.0	.31	68.0	S	H.dew, clear
	86	63	74.5		70.0	.16	42.0	SE	M.dew, clear
	87	69	78.0		69.5	.11	98.0	SE	M.dew, clear
	87	73	80.0		76.5	.15	111.0	SE	M.dew, ptly.cldy.
	86	75	80.5	0.23	84.0	.10	111.0	SE	Rain, ptly.cldy.
	87	75	81.0		78.0	.08	118.0	SE	L.dew, ptly.cldy.
	88	72	80.0		78.0	.11	86.0	SE	M.dew, ptly.cldy.
	86	72	79.0		75.5	.11	91.0	SE	H.dew, ptly.cldy.
	87	70	78.5		75.0	.12	99.0	SE	H.dew, clear
	64	59	61.5	0.38	99.0	.18	94.0	NW	Rain, cldy.
	85	59	72.0	Trace	79.0	.10	49.0	NW	M.fog, H.dew, cldy.
	85	62	73.5		79.0	.04	82.0	SE	H.dew, ptly.cldy.
	87	72	79.5		74.0	.10	109.0	S	M.dew, ptly.cldy.
	63	63	63.0	0.13	72.0	.12	91.0	NW	Rain, norther, cldy.
	61	52	56.5		75.0	.25	72.0	NW	Cldy.
	76	53	64.5		85.0	.10	43.0	N	M.dew, cldy.
	86	60	73.0	0.09	82.0	.03	37.0	SE	Rain, fog, ptly.cldy.
	87	71	79.0		76.0	.04	72.0	SE	Fog, H.dew, ptly.cldy.
	86	72	79.0		77.0	.09	86.0	SE	H.dew, ptly.cldy.
	85	73	79.0		77.5	.07	109.0	SE	H.dew, ptly.cldy.
	82	72	77.0		81.5	.10	92.0	S	H.dew, norther, cldy.
	72	60	66.0	0.02	93.5	.09	45.0	NW	H.fog, H.dew, cldy.
	81	61	71.0		80.0	.06	57.0	N	M.fog, L.dew, cldy.
	87	62	74.5		72.0	.06	40.0	SE	H.dew, clear
1	2441	1898	21695	0.85	22490	3.52	22350		
in	81.4	63.3	72.3		75.0				
ar- e m mal	+ 3.4	+ 6.2	+4.5	-0.45	+ 2.3				
umu- ed de- ture ice 1. 1	-10.3	+19.1	-3.6	+1.86	-24.9				

PRECIPITATION

imated effective -0- in.
atest in 24 hrs. 0.38 in.
hail -0- in.
sleet -0- in.
snow -0- in.
days with .01" or more 5

TEMPERATURE

Highest 90° Date 11/01/85
Lowest 46° Date 11/04/85
Date of last killing frost in the spring or first killing frost in the fall -
No. days with 32° or less -

NO. OF

Thunderstorms -0-
Windstorms 16
Days: Clear 9
Ptly. Cldy. 11
Cloudy 10 Sleet -
Snow - Hail -

ird irrigation - reading not taken

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METEOROLOGICAL RECORD
TEXAS AGRICULTURAL EXPERIMENT STATION
2415 E. Hwy. 83, Weslaco, Texas 78596

h of December, 1985; Readings taken 8 a.m.

°F AIR TEMP Max.	Min.	Mean	Precipitation Amount Inches	Avg. Rel. Hum. %	Evaporation Amount Inches	WIND Miles	Direction	Characteristics of Day
76	71	73.5		61.0	.10	113.0	NW	L.dew, norther, cldy.
55	41	48.0		53.5	.27	95.0	N	Cldy.
62	41	51.5		59.5	.19	41.0	NW	Cldy.
76	48	62.0		68.0	.21	47.0	NW	Cldy.
67	52	59.5		66.0	.06	34.0	N	L.dew, cldy.
71	41	56.0		62.0	.04	36.0	NW	L.dew, clear
80	45	62.5		65.5	.19	20.0	E	H.dew, clear
83	51	67.0		66.5	.09	41.0	SE	M.dew, ptly.cldy.
83	63	72.5		75.0	.09	75.0	SE	M.dew, ptly.cldy.
85	68	76.5		75.0	.07	111.0	N	Norther, cldy.
81	73	77.0	Trace	84.0	.07	125.0	SE	Rain, ptly.cldy.
45	43	44.0	Trace	97.0	.21	89.0	NW	Rain, L.dew, cldy.
56	39	47.5	0.17	69.0	.11	69.0	N	Rain, H.dew, clear
56	32	44.0		67.0	.04	56.0	N	Frost, clear
65	32	48.5		71.0	.29	24.0	N	Ptly.cldy.
69	30	49.5		72.0	.02	19.0	N	M.dew, cldy.
55	50	52.5	0.06	98.5	.05	49.0	N	Rain, M.dew, norther, cldy.
59	48	53.5	0.54	74.5	.04	95.0	N	Rain, H.dew, thunder, cldy.
65	42	53.5		85.0	.07	50.0	NW	M.dew, ptly.cldy.
62	42	52.0		98.0	.06	29.0	N	M.dew, cldy.
64	55	59.5	0.04	96.0	.02	45.0	NW	Rain, fog, cldy.
68	57	62.5	0.06	92.5	.02	29.0	N	Rain, fog, cldy.
74	59	66.5		74.0	.02	36.0	NW	Ptly.cldy.
65	51	58.0		65.0	.07	35.0	S	M.fog, H.dew, ptly.cldy.
62	41	51.5		67.0	.09	39.0	NW	L.dew, clear
70	42	56.0		73.5	.12	59.0	N	Cldy.
77	55	66.0		76.0	.04	64.0	S	M.fog, H.dew, ptly.cldy.
62	56	59.0		95.5	.06	49.0	NW	H.fog, H.dew, cldy
69	56	62.5		81.0	.02	34.0	N	Fog, cldy.
80	58	69.0		76.0	.05	34.0	N	H.fog, cldy.
88	58	73.0		58.5	.04	54.0	S	M.fog, H.dew, clear
2130	1540	18345	0.87	23230	2.82	16960		
68.7	49.7	59.2		74.9				
- 3.9	- 2.1	-2.3	-0.40	- 0.4				
-14.2	+17.0	-5.9	+1.46	-24.5				

PRECIPITATION

ated effective 0.60 in.
est in 24 hrs. 0.54 in.
ll - in.
eet - in.
ow - in.
ays with .01" or more 5

TEMPERATURE

Highest 88° Date 12-31-85
Lowest 30° Date 12-16-85
Date of last killing frost in the spring or first killing frost in the fall
No. days with 32° or less 3

NO. OF

Thunderstorms 1
Windstorms 7
Days: Clear 6
Ptly. Cldy. 17
Cloudy 8 Sleet -
Snow - Hail -

61

VITA

for

LEWIS E. CLARK
Seed Technology Consultant

Education

1959 -	B.S. Degree in Agronomy, Texas Tech University.
1961 -	M.S. Degree in Plant Breeding, Texas A&M University.
1967 -	Ph.D. Degree in Plant and Soil Sciences, Texas A&M University.

Employment

1959 -	Texas Department of Agriculture Seed Division. Work consisted of purity analysis, germination testing, and seed certification.
1960 - 1962	Texas Agricultural Experiment Station. Work was with corn, sorghum, cotton, and wheat.
1962 - 1973	Department of Soil and Crop Sciences, Texas A&M University. Respónsible for seed testing laboratory and carried on quality control for Foundation Seed Program as well as seed quality research.
1973 - Present	Texas Agricultural Experiment Station. Research consists of breeding for drought resistance in sorghum and cropping systems with sorghum, wheat and cotton.