



# THE IRAQI JOURNAL OF AGRICULTURAL SCIENCE

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# PERFORMANCE OF SORGHUM HYBRID IN ABU-GHRAIB

Sadi A. Tamimi

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## SUMMARY

Eight sorghum hybrids from the U.S.A. were compared with the local variety for yield and other agronomic traits in varietal tests. The objective was to determine whether the low yield of sorghum in Iraq was due to poor germoplasm or other factors. The results indicated the local variety was as good as the hybrids in yield but the plants were considerably taller. These results also indicated that yield of sorghum in Iraq can be improved by adjusting agricultural practices. Addition of fertilizers, especially nitrogen fertilizers, and establishing simple breeding plan for improving the local variety were suggested.

## الخلاصة

مقارنة أصناف من الذرة البيضاء المهجنة  
بالصنف المحلي في أبي غريب

أجريت تجارب لمقارنة ثمانية أصناف من الذرة البيضاء المهجنة بالصنف المحلي من ناحية الحاصل ومواصفة أخرى لغرض تحديد فيما إذا كان انخفاض الحاصل في العراق راجع لرداءة الصنف المحلي أم لأسباب أخرى .

وقد تبين من النتائج أن بعض الأصناف الأمريكية أعطت في العراق  $\frac{1}{4}$  إلى  $\frac{1}{2}$  ما أعطته من حاصل في أمريكا مما يدل على أن هناك عوامل بيئية تقلل إنتاج هذا المحصول في العراق .

وكان الصنف المحلي مساوياً في الإنتاج لأغلب الأصناف الأمريكية غير أن نباتات الأصناف الأمريكية كلها كانت أقصر بكثير من الصنف المحلي . وثبت أن الزراعة الخريفية كانت متفوقة على الزراعة الربيعية والصيفية . وقد تضمن التقرير بعض المقترحات لمواصلة الدراسة الغاية منها رفع إنتاج الدونم من الذرة البيضاء في هذا البلد .

## INTRODUCTION

Sorghum (*Sorghum vulgare* Pers.) is known for its tolerance to drought, heat and soil salinity (Martin and Leonard, 1951). In central and southern Iraq, where summers are very hot and dry, soils are highly saline (Buringh, 1960) and irrigation water is limited, sorghum may be more profitable than some of the other summer crops. However, the area devoted to grain

sorghum in these two regions is very small (about 4.5 % of rice land) and it is decreasing. The reduction was from 70,000 donums in 1950 to 28,400 donums in 1960<sup>1</sup>. Perhaps, one of the factors responsible for the diminishing popularity of sorghum among Iraqi farmers is

(1) Ministry of Planning, Central Bureau of Statistics, Statistical Abstract, Baghdad, Iraq, p. 119, 1962.



the low yield.

As far as known, there is only one sorghum variety in Iraq. Yield of grain sorghum here in 1961-62 was about 221 kg./donum. In comparison, sorghum hybrids in the U.S.A. give about 1,500 kg./donum (Clapp, 1958). It is not known

whether the low yield of sorghum in Iraq is due to poor germoplasm, unfavorable environmental conditions, poor agricultural practices or combinations of these factors. The objective of this work was to throw some light on the problem of low yield of sorghum in this country.

#### MATERIALS AND METHODS

Four sorghum hybrids, Amak R-10, Amak R-12, Advance 14 and Advance (Exp.) 901-11AR were obtained as seed samples from Advance Seed & Grain Co., Phoenix, Arizona. Also, four other hybrids, NK 120, NK 210, NK 222 and NK 300 were obtained from Northrup, King & Co., Minneapolis Minn., U.S.A. These eight hybrids were compared for yield, plant height, tillering and weight per 100 seeds with the local variety at the College of Agriculture farm in Abu Ghraib.

Grain yield data were obtained from two fall, one spring and one summer tests. Plant height was recorded on two fall and two spring tests. Data on tillers per plant and weight per 100 seeds were recorded on one fall test.

A randomized block design was used for each test. Number of rows per plot varied between tests from 1 to 4 rows; also rows were either 5 or 10 meters long with spacing of 90 cm. between rows and 20 cm. between hills. Each hill contained two plants except in one fall test where one plant per hill was used to obtain accurate tillering data. Number of replications varied between tests from 3 to 4 replications.

Seeding dates were early April for spring tests, first week of July for the summer test and during August for the fall tests. Yield data were obtained by harvesting mature heads from the middle two rows in tests with 4-row plots and all heads from tests with 1-row or 2-row plots. These heads were threshed and yield was adjusted to full stand then converted into kg./donum. Analysis of variance was made for the yield data in each test and for the combined yield data as well.

Plant height was recorded by taking five readings per plot from spots selected at random then calculating the averages of the five readings. Number of tillers per plant was obtained from one fall test where one plant per hill was used. Weight per 100 seeds was also obtained from the same test by counting 100 seeds four times then averaging the four weights per variety.

In addition to these notes, (date of heading) and thickness of stem (visual estimation) were also recorded.

All tests received 30 kg./donum ammonium sulfate (21% N), when the plants were 20 to 50 cm. high.



Weeding and irrigation were made when needed.

The data on plant height, tillers per plant and weight per 100 seeds are presented in table 2. From this table it was clear that the local variety was the tallest of all entries. In general the plants were taller in the fall tests than in the spring tests.

In one fall test with three replications and single row plots, 10 meters long and 20 cm. between plants tillers per plant were counted. To insure accuracy in results, the hills were thinned to one plant per hill. The result as shown in table 2 indicated that the local variety showed more tillers per plant than all other hybrids. NK 300, which was the only hybrid to outyield the check was next to the local variety in tillers per plant and in height.

In regard to weight per 100 seeds which can be considered as a measure of grain size, the local variety showed smaller size seeds than all hybrids, save NK 300. Five of the eight hybrids were distinctly superior to the check in grain size.

In addition to the above-mentioned data, notes were also recorded on earliness as measured by days from seeding to heading (30-50% of the plants in the plots showing heads). These notes indicated that the local variety was comparatively a late variety. NK 120 was very early. Also, there was remarkable difference in date of heading between the fall and spring plantings. More tests are needed before sound conclusions can be drawn on this point, however.

## RESULTS

Grain yield in kg./donum for the eight hybrids and the local variety in four tests are given in table 1. Due to insufficient seeds or poor stand one test from each of the hybrids Amak R-12, NK 120 and NK 222 was omitted. The hybrids NK 300 was omitted from both spring and summer tests because it failed to produce heads.

Analyses of variance for the four tests revealed that differences between entries were highly significant (0.01 level) in the fall and summer 1966 tests. Differences between entries were significant (0.10 level) for the spring 1966 test and non-significant for the fall 1963 test.

The combined analysis of variance revealed that differences between dates of seeding were highly significant (0.01 level). Entries within dates of seeding showed also significance (0.10 level). This indicated that hybrids performance was not consistent from one season to another. A value of 223.9 kg./donum was obtained by calculating the multiple t test for variety within dates means (t at 0.01 level).

It was evident that the fall plantings gave much better yield than either spring or summer plantings. Also, most of the hybrids performed distinctly better in the spring than in the summer. This was not true, however, in the case of the local



variety.

The local variety gave fairly good yield compared to these hybrids. Only in the fall test of 1966 the hybrid NK 300 gave significant-

ly higher yield than the local variety. In the spring test, however, all hybrids used except NK 120 gave two to four times as much yield as the check.

Table 1. Yield in Kg./donum for eight hybrids and one local variety tested at Abu Ghraib.

Entry	Fall 1963	Fall 1966	Spring 1966	Summer 1966	Mean
1. Amak R-10	441.5	189.9	262.4	144.5	259.5
2. Amak R-12	510.5	311.9	—	109.2	310.5
3. Adv. (Exp.) 901-11AR	408.1	380.7	252.8	109.4	287.8
4. Adv. 14	237.6	264.9	248.5	172.1	230.8
5. NK 120	—	137.4	78.3	59.5	91.7
6. NK 210	252.2	259.6	204.3	188.4	226.1
7. NK 222	—	295.5	143.9	85.7	175.0
8. NK 300	318.3	571.3	—	—	444.8
9. Local variety	288.6	337.3	62.4	148.1	209.1
Mean	351.0	305.4	178.9	127.1	
LSD (5%)		N.S.	175.6	N.S.	101.5

Table 2. Means of plant height, tillers per plant and weight per 100 seeds for eight sorghum hybrids and a local variety tested at Abu Ghraib.

Entry	Plant height <sup>1</sup> (cm.)	Tillers <sup>2</sup> per plant	gram per 100 seeds
1. Amak R-10	87	1.37	2.99
2. Amak R-12	91	1.63	2.77
3. Adv. (Exp.) 901-11AR	102	1.38	3.13
4. Adv. 14	89	1.35	3.27
5. NK 120	85	1.54	2.87
6. NK 210	99	1.44	3.19
7. NK 222	89	1.43	3.27
8. NK 300	125	2.07	2.55
9. Local variety	178	2.24	2.60

(1) Mean of two fall and two spring tests.

(2) Means of three replications for tillers and four replications for weight per 100 seeds taken from one fall test.



## DISCUSSION

In this study, number of rows per plot, length of rows, spacing between and within rows and number of replications were considered according to what has been recommended by other workers. For example, Stickler and Pauli (1961) used one row plots with rows spaced at 40 inches apart and 6 inches between plants. Quinby (1963) used 9 inches between plants. Lessman and Atkins (1963) used one plant per hill. LeClerc *et al.* (1962) indicated that sorghum could be tested in plots without border rows. These and other observations indicated that the procedure used in this study was valid.

During the course of this study, three spring, three fall and one summer tests were made. However, yield data were taken from four tests only. Other tests failed due to the following:

1. Spring test of 1963: was seeded April 1. Good stand was obtained, but severe bird damage interfered with recording yield. To overcome this problem heads were covered with parchment bags in all tests.
2. Spring test of 1965 and other spring tests (other projects with sorghum): it was observed that seeding early in April subjected the plants to severe damage by an insect which attacked and destroyed the seedlings upon emergence. This problem was successfully avoided by seeding

around mid-April, in spring of 1966.

3. Seeding around mid-April delayed flowering time till late May and Early June when hot spells are frequent. It is known that very hot temperatures during flowering of sorghum cause killing of pollen grains and reduce grain yield (Martin and Leonard, 1951). Such reduction in yield was quite conspicuous in the spring test of 1966. Here late varieties, especially the local variety and NK 300 gave comparatively lower yield than other entries. The very early hybrid NK 120 also exhibited low yield in this test because of high temperatures during its flowering period. From these results it seems that spring planting is risky; however, further testing of early varieties is needed before definite conclusions can be made.

In their description of sorghum groups, Martin and Leonard (1951) indicated that the Durra group which is used extensively in the Near Eastern countries "has dry stalk, flat seeds, very pubescent glumes and either compact and recurved or loose and erect panicle". These characteristics fit very well the local variety in Iraq. Also this variety was found to be comparatively tall, late maturing and extremely susceptible to covered kernel smut caused by *Sphacelotheca sorghi*. However, this



variety gave fairly good yield when compared with the hybrids in two fall tests. In the second fall test, only NK 300 significantly outyielded the local variety. This hybrid, however, was extremely late maturing (it required 128 days from seeding to harvesting compared to 113 days for the local variety). Also, NK 300 failed to produce heads in both spring and summer tests. This hybrid and the local varieties were superior to all other hybrids in tillering, but exhibited smaller seeds and taller plants. Excessive height in sorghum is undesirable because of difficulty in harvesting and subjects the plants to lodging.

In general, the yield in these tests was far below expectation for the hybrids. Clapp (1958) for example obtained yields of the hybrids Amak R-10, and Amak R-12 under irrigation about 1,625, 1,732 per donum. In this investigation these hybrids gave from about 0.16 to 0.30 of their yield in the U.S.A. This indicates that the problem of low yield of sorghum in Iraq is not due to poor germoplasm alone but to other environmental factors. Some of the factors which merit thorough investigation are: application of fertilizers (sorghum is known

for its high requirements of nitrogen), spacing between plants and rows, salinity effects and date of seeding.

In the light of the results which were obtained in this investigation sorghum yield may be improved considerably in this country through the following steps:

1. Simple breeding plans such as mass selection may be followed to improve the local variety. The adaptability of the local material should be fully utilized here.
2. Experiments should be initiated in the various regions of sorghum areas with the objective of determining the optimum date of planting, space per plant, response to fertilizers and other agricultural practices. Such factors have been thoroughly investigated in other countries, but as far as known they have not been studied in Iraq.
3. Standard varieties should be imported from other countries to be used as a source of genetical material in breeding plans whether for disease resistance or for production of hybrids in the future. Some progress has been made so far in this last step.

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# PAPER CHROMATOGRAPHIC SEPARATION ON FREE SUGARS OF THREE VARIETIES OF IRAQI DATES AT DIFFERENT STAGES OF MATURITY

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## SUMMARY

Changes in free sugars in three varieties of dates during different stages of maturity were investigated, using paper chromatography. Results of qualitative analyses showed that glucose and fructose were predominant at the earlier stages. Sucrose appeared in the full color stage (yellow or red). In the 100% soft and dry stages sucrose decreased or disappeared.

## الخلاصة

أجريت دراسة حول تغيير السكريات الحرة الموجودة في ثلاثة أصناف من التمر العراقية خلال مراحل مختلفة من النضج وذلك باستخدام طريقة الفصل الكروماتوغرافي على الورق ولقد أظهرت نتائج التحليل النوعية أن سكري الكلوكوز والفركتوز كانا بكميات أكثر من السكريات الأخرى في مراحل النضج المبكرة. أما السكروز فقد ظهر في مرحلة النضج الملونة (الصفراء أو الحمراء) ولكنه نقص أو اختفى في مرحلتى النضج ١٠٠ بالمائة والجفاف.

## INTRODUCTION

Development of a partition method of chromatography in which sheets or strips of filter paper are used instead of the familiar packed column, has already shown its usefulness as a method for qualitative analysis of proteins and their amino acids (Consden, Gordon and Martin, 1944.)

A study of the distribution of amino acids in green, yellow, red, brown and dark-brown stages of ripening of Californian Daglat Nuur dates was carried out using paper chromatography (Rinderknecht, 1959.)

In general, the experimental conditions that allow the separation

of the amino acids are also suitable for the qualitative analysis of reducing sugars (Partridge, 1946). The use of paper chromatography has revolutionized the study of the structure of carbohydrate polymers and has given added impetus to further study in carbohydrate metabolism (Kowabany, 1954). The great value of this method lies in its ability to separate and identify the components of complex mixtures of carbohydrates, quickly, and accurately and with expenditure of less than a milligram of material.

In previous communications changes in reducing sugars and sucrose during the stages of maturation



tion of Californian Daglat Nur and Samani dates were studied quantitatively (Postlethwaite, 1930 and Ashmawi *et. al.*, 1955).

The present investigation describes the qualitative analysis of sugars of Iraqi dates during maturation, using paper chromatography.

## MATERIALS AND METHODS

### Materials

Date varieties used in this investigation were Zahdi, Khadraawi and Berbin. Samples were collected when date fruits were uniformly green, yellowish-green, yellow, 50% soft, 100% soft and dry.

### Extraction

In the earlier (green to yellow or red) stages the outer colored tissues were separated completely from the inner white tissues and qualitative analysis was run on each part separately. In later stages, no separation of tissues was done before analysis. Five grams of the tissue were extracted with 100 ml of hot water at 70°C in a waring blender for 2 minutes. The extract was passed through cheese cloth, the residue reblended, and the combined extract was filtered. The filtrate was treated with charcoal and the clear extract was used for the qualitative analysis.

### Paper Chromatography

The date extracts were analyzed by paper chromatography using Whatman No. 1 filter paper, and n-butanol-acetic acid-water (40:10:22V/V) as a solvent (Smith, 1958). Chromatograms were triple developed for a total seventy two hours at room temperature. Every twenty four hours the paper was removed and air-dried. The paper was then sprayed with aniline-phthalate indicator solution. (Partidge, 1949.) When dry, the paper was heated for 15 minutes at 120°C in the oven. Sugars were identified by the R<sub>f</sub> and R<sub>g</sub> values obtained by running standards.

The aniline hydrogen phthalate solution prepared by adding 0.93g aniline (colorless) and 1.66 g. phthalate anhydride to 100 ml. water saturated n-butanol, and mixing thoroughly to get a clear solution.

## RESULTS

The free sugars of Zahdi during different stages of ripening are shown in Figures I and II. Chromatograms shown were obtained by spotting 0.04 ml. aliquots of the extracts. Variations in relative

amounts of sugars during the indicated ripening stages roughly estimated by visual comparison of area and density of color of spots corresponding to the identified sugars.



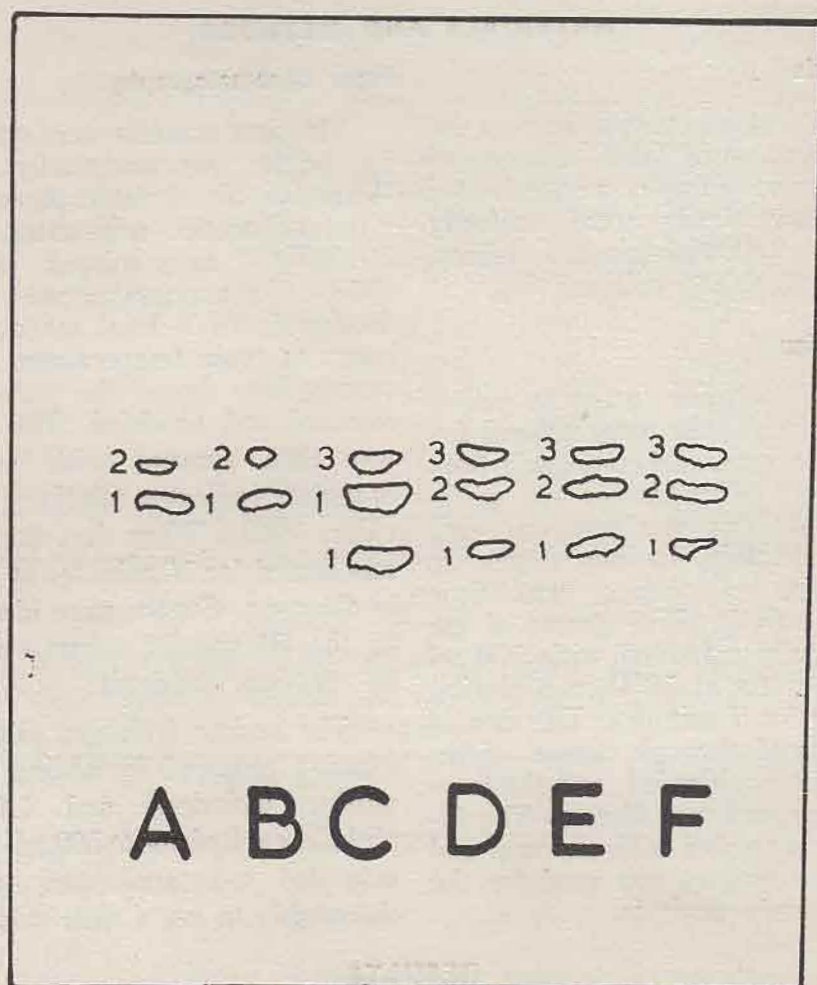


Fig. 1. Chromatograms of sugars from Zahdi dates. A and B, green stage (white and colored tissues, respectively); C and D, yellowish-green stage; E and F, yellow stage.

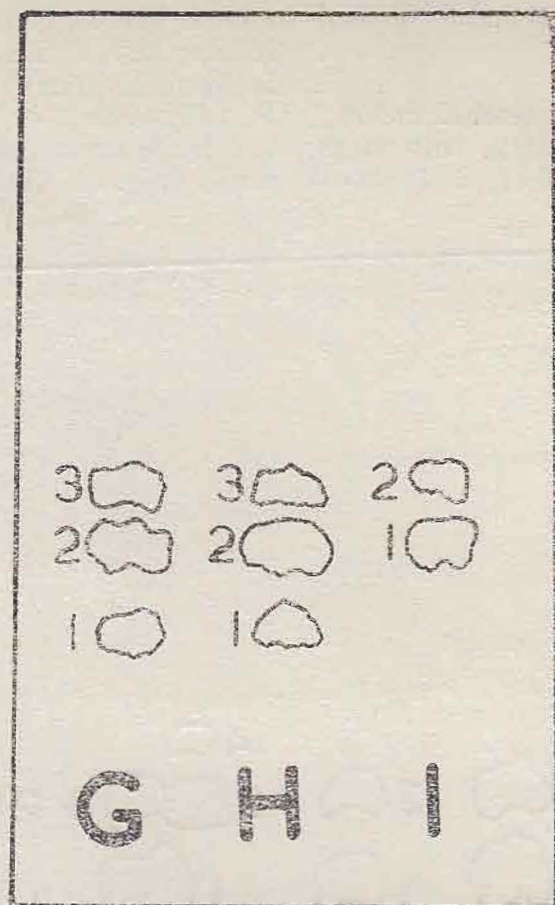


Fig. II. Chromatograms of sugars of Zahdi dates. G, 50% soft stage; H, 100% soft stage; I, dry stage.

Chromatograms A and B of Fig. I show the free sugars in the white and the green tissues of Zahdi fruits in the green stage, respectively. Spots number 1 and 2 represent glucose and fructose respectively. Area of glucose spot about twice as big as that of fructose. Only traces of sucrose were observed in Zahdi fruits at this stage. In the yellow-green stage (Chromatogram C), amount of glucose (spot no. 2) and fructose (spot no. 3) increased in

white tissues in comparison with that in the green stage (Chromatogram A). However, amount of sucrose was close to that of glucose. Chromatogram D shows the free sugar in the colored tissues at the yellowish-green stage. Concentration of all three sugars were lower in the colored than in the white tissues at this stage. In the yellow stage, there were no obvious differences in concentrations of free sugars in white and colored tissues



(Chromatograms E and F, respectively).

When the fruits reached the 50% soft stage and 100% soft stage, color densities and areas of spots of

sucrose (no. 1), glucose (no. 2) and fructose (no. 3) increased as shown in Chromatograms G. and H of Fig. II, whereas in the dry stage of the fruits no sucrose could be detected (Fig. II, Chromatogram 1).

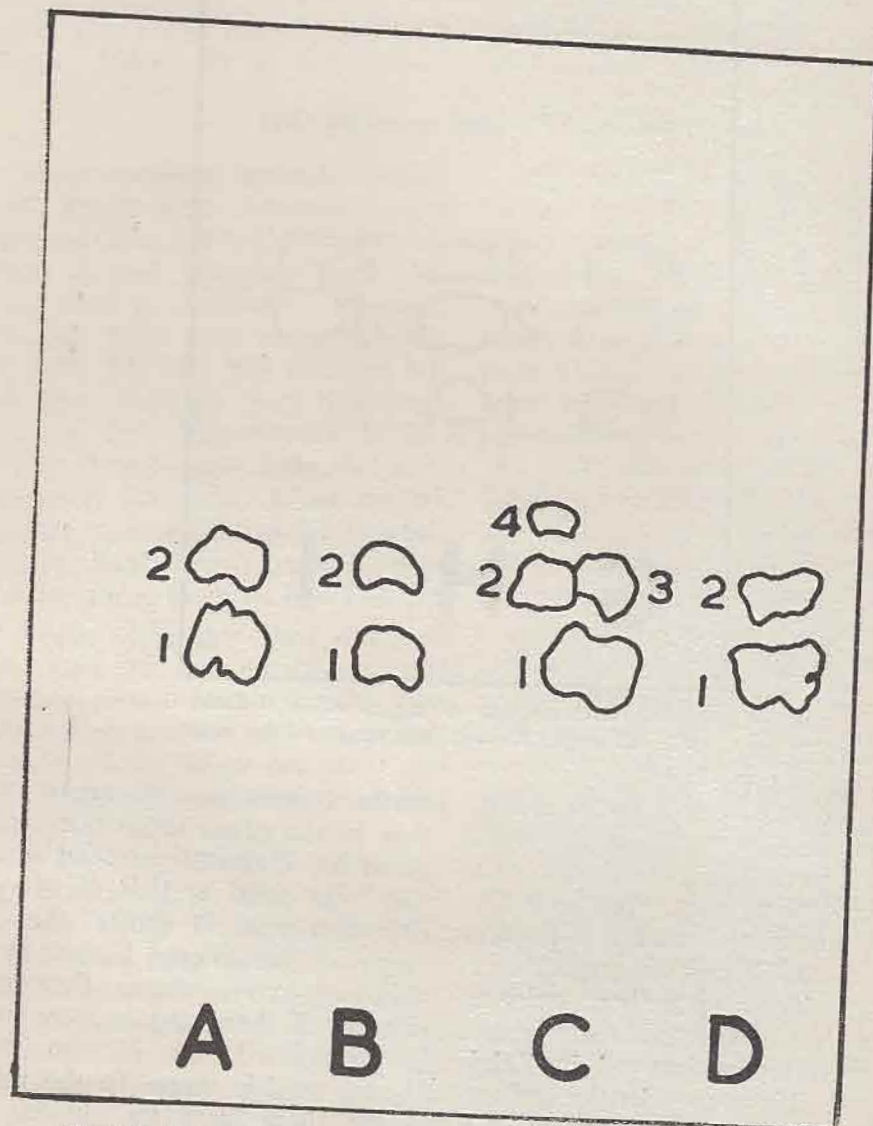


Fig. III. Sugar Chromatograms of Khadraawi dates. A and B green stage (white and colored, tissues, respectively); C and D, yellowish-green stage.

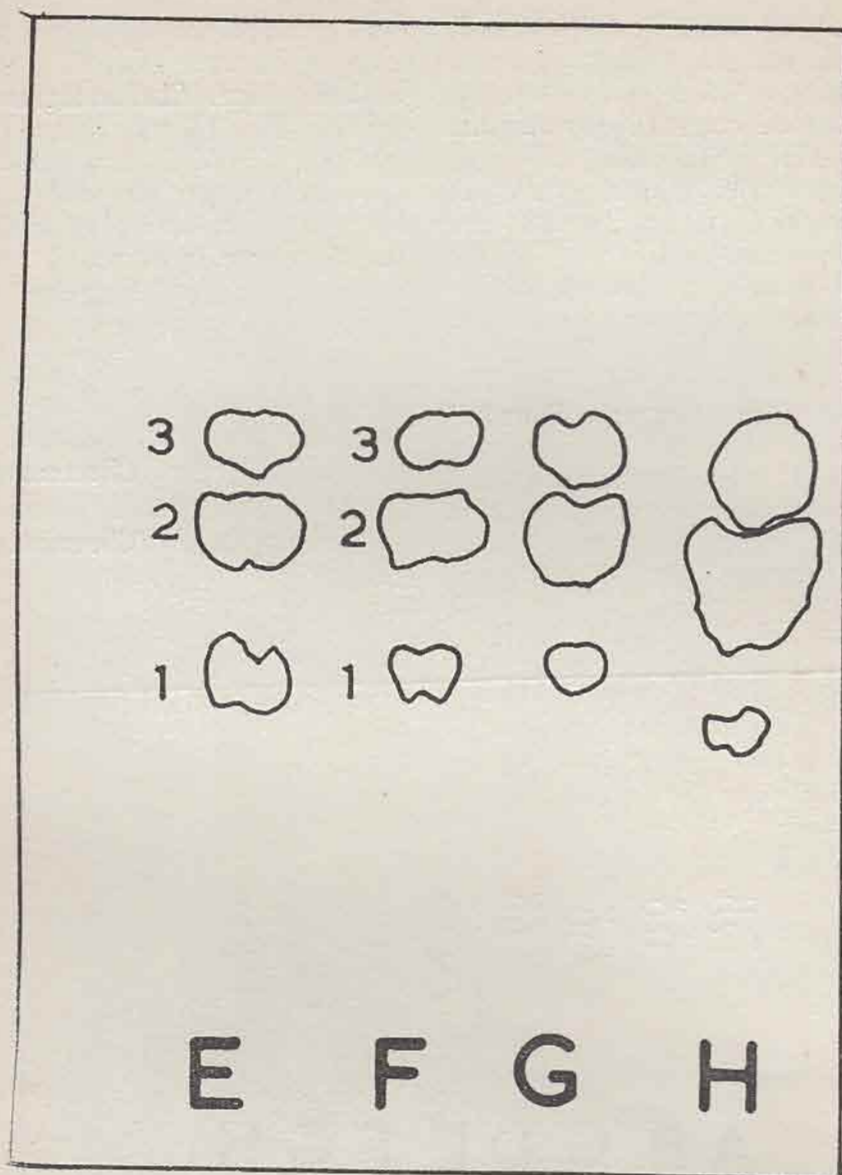


Fig IV. Chromatograms of sugars of Khadraawi dates. E and F, yellow stage (white and colored tissues, respectively); G, 50% soft stage; H 100% soft stage.

For all Chromatograms of Figures III and IV, 0.08 ml. aliquots of Khadraawi extracts were used. In the green stage, the results were similar to those found for Zahdi. This can be seen from chromatograms A and B of Fig. III which represent the free sugar in white



and colored tissues of Khadraawi fruits in the green stage, respectively. In the White tissues of the yellow-green stage (Chromatogram C, Fig. III) the following four spots were observed: glucose (spot no. 1), fructose (spots no. 2 and 3), and an unidentified spot (no. 4). In the colored tissues of the yellowish-green stage, only glucose (spot no. 1) and fructose (spot no. 2) were observed (Chromatogram D, Fig. III). Moreover Chromatograms E and F of Fig. IV show the free sugars in white and colored tissues at the yellow stage, respectively. At this stage, the sugars were sucrose (spot no. 1), glucose (spot no. 2) and

fructose (spot no. 3). Amount of these sugars were more than in the previous stage. Chromatograms G and H of Fig. IV represent the free sugars at the 50% soft and the 100% soft stages, respectively. At these stages, areas and color densities of glucose (spot no. 2) and of fructose (spot no. 3) increased while that of sucrose decreased. In the case of Berbin (Fig. V), results similar to those of Khadraawi were obtained except that there was no unidentified sugar (Chromatogram C) and no sucrose was detected at 100% soft stage (Chromatogram H).

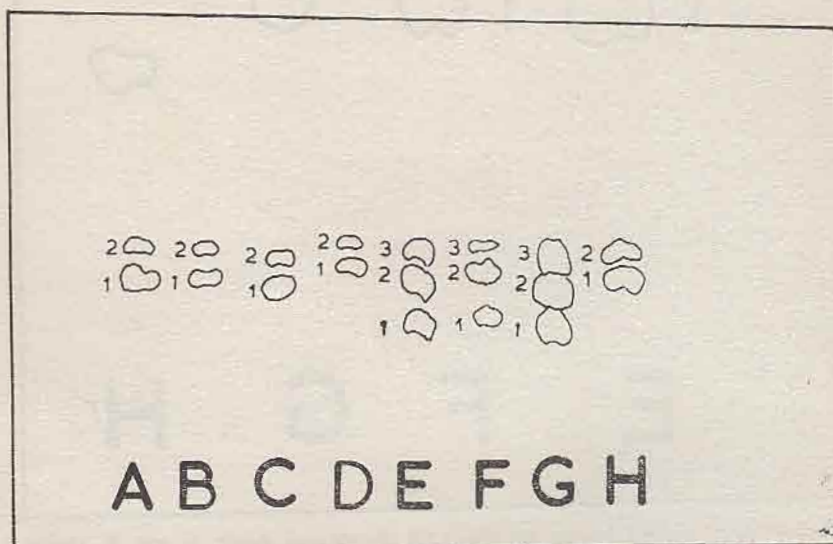


Fig. V. Sugars chromatograms of Berbin dates. A and B, green stage (white and colored tissues, respectively); C and D reddish-green stage; E and F, red stage; G, 50% soft stage; H, 100 soft stage.

## CONCLUSION

From these results it can be concluded that:

1. Glucose and fructose were the main free sugars in date fruits at the earlier stages of maturity (green and yellowish-green or reddish-green stages).
2. In addition to glucose and fructose, sucrose was present in in-

termediate stages of maturity (yellow or red stages).

3. Sucrose disappeared at the later stages of maturity (100% soft and dry stages) presumably to the formation of invert sugar through the action of the enzyme invertase, whereas glucose and fructose increased in amount.

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# EFFECT OF DATE AND RATE OF SOWING AND DRILL SPACING ON WHEAT YIELD UNDER IRRIGATION AND DRY FARMING IN IRAQ

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## SUMMARY

From a split plot experiment with three dates and rates of sowing Ajeba wheat and three drill spacings, applied for three years at Abu Ghraib (which represents the central-irrigated region of Iraq) and at Bakerajo station (which represents the northern dry farming region of Iraq)  $D_2 R_3 S_1$  and  $D_1 R_3 S_1$  (the second and first date of sowing with 32 Kg. seed per acre and 15 cm. spacing) were significantly the best yielding treatment at Abu Ghraib and Bakerajo, respectively.

## الخلاصة

في تجربتي أحواض منشقة Split Plots باستعمال ثلاثة مواعيد زراعية مبكر ، متوسط ، ومتأخر ، وثلاثة كميات بذور من الحنطة العجيبة مقدارها ١٦ ، ٢٤ ، ٣٢ كغم للايكرو وثلاثة مسافات بين السطور هي ١٥ ، ٢٠ ، ٣٠ سم مغطية مدة ثلاثة سنوات في أبي غريب المشقة للمنطقة الوسطى الاروائية وبكرهجو - السليمانية المشقة للمنطقة الشمالية القديمة الرطبة في العراق ، وجد فرق احصائي عالي للحاصل بالنسبة للمواقع والسنوات وكميات البذور ومسافات الزراعة في سطور والمواقع  $\times$  السنوات ، ووجد تأثير احصائي لمواعيد الزراعة والمواقع  $\times$  السنوات وكميات البذور  $\times$  السنوات والمسافات بين السطور  $\times$  السنوات .

فبالنسبة لمحطة أبي غريب أعطت السنوات ، مواعيد الزراعة ، والمسافة بين السطور تأثير احصائي عالي للحاصل واعطت كميات البذور ، المواعيد  $\times$  السنوات ، المواعيد  $\times$  كميات البذور  $\times$  المسافات بين السطور  $\times$  السنوات ، تأثير احصائي للحاصل . ان موعد الزراعة الثاني ( منتصف تشرين الثاني ) مع استعمال ٣٢ كغم بذور للايكرو وعلى أساس الزراعة في سطور بمسافة قدرها ١٥ سم كانت افضل المعاملات متحدة مع بعضها البعض حيث أدت الى ١٦٧٦٥٪ زيادة في الحاصل بالنسبة للموعود الثالث ( منتصف كانون الاول ) وباستعمال ١٦ كغم بذور للايكرو وعلى أساس الزراعة في سطور على مسافة قدرها ٣٠ سم والتي كانت اوطأ المعاملات في الحاصل .

اما بالنسبة لمحطة بكرهجو - السليمانية فقد أعطت السنوات ومسافات الزراعة في سطور تأثير احصائي عالي للحاصل واعطت كميات البذور تأثير احصائي للحاصل . ان استعمال الموعد الاول للزراعة ( الاسبوع الاول من تشرين الثاني ) وبمعدل ٣٢ كغم بذور للايكرو وعلى أساس الزراعة في سطور على مسافة ١٥ سم كانت اعلى المعاملات في الحاصل وادت الى زيادة مقدارها ٩٠٧٢٪ في الحاصل بالنسبة لموعود الزراعة الثاني ( الاسبوع الرابع من تشرين الثاني ) وباستعمال ١٦ كغم بذور للايكرو وعلى أساس الزراعة في سطور على مسافة ٣٠ سم والتي هي اوطأ المعاملات في الحاصل .

## INTRODUCTION

Wheat is the main grain crop in Iraq with an average annual production of about one million tons. Sixty five percent of the crop is usually produced under dry farming and the rest is usually produced under irrigation. The method of planting wheat practised by the Iraqi farmers is the broadcasting method. Date of sowing is between early October and early January. The rate of seeding varies from 24 to 40 kg. per acre.

The purpose of this study was to obtain information on the influence of date, and rate of sowing and drill spacing on yield produced under irrigation and dry farming in Iraq, in order to apply it in these regions.

## REVIEW OF LITERATURE

The following references were reviewed on dry farming sowing wheat, except reference number 6 which was done under irrigation. Heavier seeding rate was recommended for late date of sowing (1,7). The date of seeding was more important for securing maximum yield than rate of seeding (5, 6). Both date and rate of sowing differed significantly in amount of yield produced. Rates within years

showed tendency to remain constant, but dates within years usually varied (1, 2, 7, 8).

The seed rates 2, 4 and 6 pecks per acre and the 7 or 9 inches row spacing gave the highest yield. As the row spacing increased from 9 to 11 inches and from 11 to 14 inches, the yield produced decreased constantly with any rate of sowing (3, 4).

## MATERIALS AND METHODS

Two split plot experiments with four replications were conducted at Abu-Ghraib station, which represents the central irrigated region and at Bakerajo, which represents the humid northern rainfed region of Iraq at an average annual precipitation of 36 inches. The duration of the experiments at both stations was three years (1958-1960). Three sowing dates, early (mid-October), Middle (mid-November), and late (mid-December), were used at Abu-Ghraib and three other sowing dates early (first week of November), Middle (fourth week of November) and late (mid-Decem-

ber), were used at Bakerajo. Each date consisted of three sowing rates 16, 24 and 32 Kg. seeds per acre, and each rate consisted of three drill spacings 15, 20 and 30 cm. respectively. There were four, six and eight rows for each drill-spacing 30, 20 and 15 cm. The length of the row was 5 meters. Seeding was done by hand using the local Ajeba 210 bread wheat. Harvesting also was done by hand and threshing was made by a small motor driven nursery thresher. Grain yield was weighed in grams, converted to bu/acre and analyzed statistically using the analysis of



variance method.  $D_1$ ,  $D_2$  and  $D_3$  were used for the early, middle and late date of sowing, respectively.  $R_1$ ,  $R_2$  and  $R_3$  were used for the 16, 24 and 32 Kg. seeds per acre,

respectively.  $S_1$ ,  $S_2$  and  $S_3$  were used for the 15, 20 and 30 cm. drill spacings, respectively;  $Y_1$ ,  $Y_2$  and  $Y_3$  represented the first, second and third year of sowing, respectively.

#### EXPERIMENTAL RESULTS

The average yield data bu/acre for Abu-Ghraib and Bakerajo stations are shown in Table 1. The

Table 1. Average yield in bu/acre for Abu-Ghraib and Bakerajo stations from planting Ajeba wheat 1958 to 1960.

Treatment	Abu-Ghraib	Bakerajo
$D_1R_1S_1$	32.61	28.31
$D_1R_1S_2$	33.67	26.46
$D_1R_1S_3$	24.34	19.39
$D_1R_2S_1$	36.86	29.90
$D_1R_2S_2$	28.97	24.93
$D_1R_2S_3$	27.69	21.87
$D_1R_3S_1$	41.29	33.89
$D_1R_3S_2$	37.78	26.07
$D_1R_3S_3$	27.69	23.82
$D_2R_1S_1$	34.74	24.39
$D_2R_1S_2$	31.41	27.49
$D_2R_1S_3$	27.33	17.77
$D_2R_2S_1$	38.51	26.98
$D_2R_2S_2$	34.81	25.06
$D_2R_2S_3$	27.71	19.54
$D_2R_3S_1$	43.44	28.87
$D_2R_3S_2$	40.66	27.07
$D_2R_3S_3$	31.23	21.42
$D_3R_1S_1$	21.52	23.14
$D_3R_1S_2$	23.31	22.38
$D_3R_1S_3$	16.23	18.39
$D_3R_2S_1$	28.98	24.09
$D_3R_2S_2$	23.53	26.01
$D_3R_2S_3$	15.97	19.18
$D_3R_3S_1$	27.82	23.90
$D_3R_3S_2$	24.58	22.70
$D_3R_3S_3$	19.22	22.00

results of yield analysis of variance for both stations gave a highly significant difference ( $P < .01$ ) for years, locations, rates, spacings and locations x year and a significant difference ( $p < .05$ ) for dates, dates x years, rates x years, and spacings x years. These results indicated that years differed according to different locations and dates; rates and spacings differed according to different years. Date, rate and spacing gave a highly significant linear response.

The yield analysis of variance at Abu-Ghraib irrigated station showed that years, dates and spacings were highly significant ( $p < .01$ ) and that rates, dates x years and dates x rates x spacings x years were significant ( $p < .05$ ). These results indicated that dates responded differently in different years and that certain dates, rates and spacings treatments were not constant in different years. There was a significant difference between  $Y_2$  and both  $Y_1$  and  $Y_3$ , but there was no significant difference between  $Y_1$  and  $Y_3$ .  $D_2$  was significantly better than  $D_1$  with 154.05% of  $D_3$ , and  $D_1$  was significantly better than  $D_3$  with 144.61% of  $D_3$  (Table 2). There was a highly



Table 2. Average yield in bu/acre and percentage increase at Abu-Ghraib station from planting Ajeba wheat

Treat- ment	Y <sup>1</sup> 57-58		Y <sup>2</sup> 58-59		Y <sup>3</sup> 59-60		Average % of check	Grand $\bar{X}$	% of check
	$\bar{X}$	% of check of	$\bar{X}$	% of check	$\bar{X}$	% of check			
D <sub>2</sub>	25.64	295.75	51.66	129.28	27.40	148.83	191.28	34.43	154.05
D <sub>1</sub>	31.62	364.71	42.10	105.36	23.25	126.29	198.79	32.32	144.61
D <sub>3</sub>	8.67	100.00	39.96	100.00	18.41	100.00	100.00	22.35	100.00
R <sub>3</sub>	23.34	100.17	50.23	127.56	24.33	119.44	115.72	32.63	119.79
R <sub>2</sub>	19.29	82.79	44.03	111.64	24.34	119.49	104.64	29.22	107.27
R <sub>1</sub>	23.30	100.00	39.44	100.00	20.37	100.00	100.00	27.24	100.00
S <sub>1</sub>	26.15	154.64	50.79	136.06	26.40	144.98	145.23	33.97	140.66
S <sub>2</sub>	22.87	135.25	45.60	122.15	24.44	134.21	130.54	30.97	128.24
S <sub>3</sub>	16.91	100.00	37.33	100.00	18.21	100.00	100.00	24.15	100.00

Table 3. Average yield in bu/acre and percentage increase at Bakerajo station from planting Ajeba wheat

Treat- ment	Y <sup>1</sup> 57-58		Y <sup>2</sup> 58-59		Y <sup>3</sup> 59-60		Average % of check	Grand $\bar{X}$	% of check
	$\bar{X}$	% of check of	$\bar{X}$	% of check	$\bar{X}$	% of check			
D <sub>1</sub>	25.65	130.80	32.03	98.61	20.73	136.20	121.87	26.07	116.28
D <sub>2</sub>	24.95	127.23	31.07	95.66	16.85	110.71	111.20	24.29	108.34
D <sub>3</sub>	19.61	100.00	32.48	100.00	15.22	100.00	100.00	22.42	100.00
R <sub>3</sub>	24.96	110.49	33.83	115.26	17.99	104.05	109.93	25.53	110.62
R <sub>2</sub>	22.65	100.27	32.37	110.29	17.52	101.33	103.96	24.17	104.72
R <sub>1</sub>	22.59	100.00	29.35	100.00	17.29	100.00	100.00	23.08	100.00
S <sub>3</sub>	25.40	126.18	37.13	146.47	18.62	118.98	130.54	27.05	132.73
S <sub>2</sub>	24.67	122.55	33.06	130.41	18.53	118.40	123.79	25.35	124.39
S <sub>1</sub>	20.13	100.00	25.35	100.00	15.65	100.00	100.00	20.38	100.00



significant difference among  $S_1$ ,  $S_2$  and  $S_3$ .  $S_1$  vs.  $S_3$  gave a highly significant trend, thus as the drill spacing decreased from 30 cm. to 15 cm. as the amount of yield produced increased.  $S_1$  and  $S_2$  resulted in 140.66% and 128.24% of  $S_3$ . There was a significant difference between  $R_3$  and  $R_2$  with 119.79% and 107.27% of  $R_1$ .  $R_2$  vs.  $R_1$  resulted in a highly linear trend, showing that heavy seeding rate produced higher yield than light seeding rate. There was a consistent yearly yield increase by using  $D_2R_3S_1$ .

The yield analysis of variance at Bakerajo humid dryland farming station, revealed that only years and spacings were highly significant and

only rates were significant.  $Y_1$ ,  $Y_2$  and  $Y_3$  were differed significantly from each other.  $S_1$  and  $S_2$  were significantly better than  $S_3$  with 132.73% and 124.39% of  $S_3$  (Table 3).  $S_1$  vs.  $S_3$  gave a highly linear trend, showing an increase in yield with each reduction in spacing up to 15 cm.  $R_3$  was significantly better than  $R_1$  with a highly significant linear trend. However, there was no significant difference between  $R_1$  and  $R_2$ ,  $R_2$  and  $R_1$ .  $R_3$  and  $R_2$  produced 110.62% and 104.72% of  $R_1$ .  $D_1$  and  $D_2$  resulted in 116.28% and 108.34% of  $D_3$ , though dates were not significant. At both stations  $S_1$  and  $R_3$  gave the highest yield in any date used, and  $S_1$  gave the highest yield in any rate used.

## DISCUSSION

The 15 cm. drill spacing and 32 Kg. seeds per acre were significantly the best treatments at Abu-Ghraib and Bakerajo stations. The second date of sowing (mid-November), was significantly better than the first and third dates of sowing at Abu-Ghraib. Though, there was no significant difference among dates of sowing at Bakerajo, but the first sowing date (first week

of November) gave 116.28% and 108.34% of  $D_3$  and  $D_2$ , respectively.  $D_2R_3S_1$  which was significantly the best treatment at Abu-Gharib produced 167.65% increase in yield in comparison with the significantly lowest treatment  $D_3R_1S_3$ .  $D_1R_2S_1$  which was the best treatment at Bakerajo produced 90.72% increase in yield in comparison with the lowest treatment  $D_2R_1S_3$ .

## SUMMARY

From two split plot experiments with three sowing dates, early, middle and late, three sowing rates, 16, 24 and 32 Kg. of local Ajeba wheat seeds per acre, and three drill spacings 15, 20 and 30 cm. applied for three years at Abu-Ghraib

central irrigated station and Bakerajo northern dryland farming station in Iraq, a highly significant yield response was found for locations, years, sowing rates, drill spacings, and locations x years and a significant response was found for



sowing dates, dates x years, rates x spacings, which was the lowest combination.

At Abu-Ghraib station, years, sowing date and drill spacing gave a highly significant yield response, but sowing rate, dates x years and dates x rates x spacings x years gave a significant yield response. The second sowing date with 32 Kg. seeds per acre and 15 cm. spacings, which was the best combination, resulted in 167.65% increase in yield of the third sowing date with 16 Kg. seeds per acre and 30 cm.

At Bakerajo station, years and drill spacing gave a highly significant yield response, and sowing rate gave a significant response. The first sowing date with 32 Kg. seeds per acre and 15 cm. spacing, which is the highest yielding treatment resulted in 90.72% increase in yield of the second sowing date with 16 Kg. seeds per acre and 30 cm. spacing.

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# USE OF RADIO-ISOTOPE ( $I^{131}$ ) FOR STUDYING SOME MERITS IN POULTRY PHYSIOLOGY AND BREEDING

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## SUMMARY

The thyroid activity of four groups of chicks, reared under high thermal and normal conditions, were determined (in vivo) by using radio-isotope  $I^{131}$ . It was found that:

1. High environmental temperature had a negative effect on the thyroxine secretion rate (thyroid radio-activity).
2. Reserpine gave a positive effect, when it was added to the chick's rations reared under high environmental temperatures.
3. A correlation was proved between the classical method for measuring thyroxine secretion rate and the new isotope method. The later method can be used efficiently in selecting chicks to be reared under hot climate.
4. A correlation between the body weight of the organisms and the thyroxine secretion rate was established.

## الخلاصة

لقد تم قياس نشاط الغدة الدرقية لاربعة مجاميع من الافراخ المرباة في ظروف المناخ الحار وفي الظروف الطبيعية وذلك باستخدام النظائر المشعة (اليود المشع  $I^{131}$ ) ولقد وجد ما يلي :-

- ١ - تؤثر درجات الحرارة العالية تأثيراً سلبياً على نشاط الغدة الدرقية للحيوان وانعبر عنه بمعدل افراز الثايروكسين .
- ٢ - ان اضافة مادة الريزيربين المهدنة (Reserpine) الى علائق الافراخ تغطي تأثيراً ايجابياً على نشاط الغدة الدرقية للافراخ المرباة في ظروف المناخ الحار .
- ٣ - ان طريقة استخدام النظائر المشعة لتعيين نشاط الغدة الدرقية للحيوان يمكن ان تستخدم كأحدى الطرق المهمة في انتخاب الافراخ المرباة في ظروف درجات الحرارة العالية، لقد تم اثبات وجود علاقة مباشرة بين الطريقة التشريحية القديمة لتعيين نشاط الغدة الدرقية وبين طريقة استخدام النظائر المشعة الحديثة .
- ٤ - لقد تم اثبات وجود علاقة طردية بين الوزن الحي للحيوان وبين معدل افراز الثايروكسين لغدته الدرقية (نشاط الغدة) في هذه الدراسة .

## INTRODUCTION

The thyroid gland, besides its effect upon the nervous system, has a considerable influence on the growth and development of both human beings and animals. This was proved by Winchester and Kleiber (1938), Winchester and Davis (1952), Winchester and Scarborough (1953) and Pipes and Premachandra (1958). The difference in the growth and development is caused mainly

by changes which take place in the metabolical processes caused by thyroid gland. This was studied by Lee and Lee (1937), Miller (1938), Leblond and Evans (1944), Schacher et al. (1949), and Macbeth and Noble (1949). At the same time, the thyroid gland in poultry plays specific role in the growth of feathers. In poultry a research problem investigated the relation between the thyroid activity and the thermoregulation (Barelli, 1932; Kleiber and Dogerty, 1937; Winchester, 1940). These workers expressed the thyroid activity by means of some anatomical characteristics as epithelial tissue, follicle's diameter, the development of blood vessels and other characteristics suggested by Rawson and Starr (1938) and Dvokins (1949). By using this classical method, the animal must be sacrificed, therefore, it can not be of benefit for breeding

purposes.

Recently many workers conducted research on the possibility of speeding up the processes of poultry selection by using radio-isotope ( $I^{131}$ ) for determining the thyroid radio-activity. It is necessary to say that using radio-isotope method needs not the sacrifice of the animal.

The purpose of this paper is:

1. To determine the effect of high environmental temperature on the thyroid activity.
2. To study the effect of using tranquilizers (reserpine) on the thyroxine secretion rate.
3. To check the relationship between the classical method for measuring thyroxine secretion rate and the isotope method.
4. To find the relationship between the intensity of the thyroid radio-activity and the growth of the chicks.

#### MATERIALS AND METHODS

Two hundred sixty chicks were held in a climatological chamber controlled with automatic devices. The air temperature was 40°C during the day and 30°C at night. The chicks were divided into four equal groups (65 chicks per group).

Two groups were held under high environmental temperature. One of them was control, and the other received 4 gm. reserpine (trimethoxy benzoate ester of methyl reserpate,  $C_{23}H_{40}N_2O_9$ ) per Kg. ration. The third and fourth groups were maintained under normal thermal condition with and

without reserpine. All four groups were one-day old chicks and raised to a period of 75 days. Then three average chicks similar in weight, growth and other biological characteristics were randomly selected from each group. All the twelve selected chicks were raised in battery brooders. The first day was left for acclimatization of chicks to the new conditions after adding 0.1% methyl thiouracil ( $CH_3C:CH.O(OH):N.O(SH):N$ ) to their old ration. As a result of this work it was found that a dose of 5.  $\mu$ c.  $I^{131}$ /100 gm. body weight was harm-



ful and deteriorous. Consequently, some modifications were made on the method suggested by Pipes and Premachandra (1958). The procedure was as follows:

- 1st day: Injection of  $I^{131}$  with a dose of 3  $\mu\text{c.}/100$  gm. body weight.
- 2nd day: Reserve measurement of thyroid radio-activity (micro-ampere/min) then 0.1% methyl thiouracil was added to the ration.
- 3rd day: First measurement of thyroid radioactivity (essentially the first point in the curve) then immediately 0.5  $\mu\text{g.}$  L-thyroxine/100 gm. body weight was injected.
- 4th day: Second measurement of radio-activity (second point), then a dose of 1.5  $\mu\text{g.}$  L-thyroxine/100 gm. body weight was injected.
- 5th day: Third measurement of radio-activity (third point). Then immediately a dose of 3.5  $\mu\text{g.}$  L-thyroxine/100 gm. body weight was injected.
- 6th day: Fourth measurement of

thyroid radio-activity.

The measurements of thyroid radio-activity were done by using a special counter (Fig. 1.) All measurements were taken at 3.00 p.m. Radio-Iodine and L-thyroxine injections were given subcutaneously. The dilution of the required solutions was accomplished by using a light alkaline.

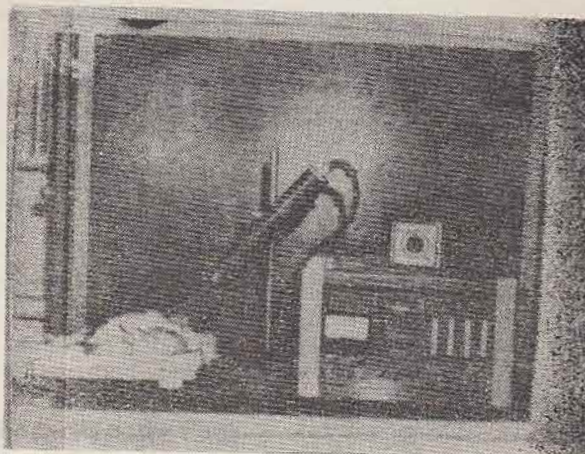


Fig. 1.  
General feature of the counter for measuring thyroid radio-activity of chicks.

## RESULTS AND DISCUSSION

Necessary correction for isotope decaying was made to the obtained measurements. The corrected measurements of thyroid radio-activity which are expressed in units of micro-rontgen/hour are shown in table I. Data in table 1 can be portrayed graphically (Figure 2.3) to demonstrate the thyroxine secretion rate (T.S.R.) of either group of chicks as a whole (Fig. 2) or the individuals of each group respectively. The obtained results were significantly low after injecting a high dose (3.5  $\mu\text{g.}/100$  gm. body weight) of L-thyroxine, as such it was not included in the graph. The findings in (Fig. 2) help in collecting the following estimations of thyroxine secretion rate for different groups of chicks (Table 2).

Table 1. Average measurements of thyroid radio-activity (micro-rontgen/hour) for different groups of chicks.

Group of chicks.	Chicks No.	1st	2nd	Measurements (corrected)			% to the previous measurement			
				3rd 95% Confidence Limits	4th	5th	2nd	3rd 0.5 mg one day after adding thioumei/	4th 1.5 mg	5th 3.5 mg
High environmental temperature.										
A.	1	18.6	15.7	14.6	13.0	13.0	84.4	93.0	89.0	100.0
without adding reserpine	2	18.6	16.5	15.8	14.0	13.0	88.7	95.8	88.6	92.9
B.	3	15.4	14.6	13.3	77.0	10.7	95.1	90.8	83.0	96.8
Adding 4 mg. reserpine/kg. ration.	4	30.9	18.0	16.5	16.0	13.0	86.1	91.7	90.9	86.7
	5	24.0	20.5	17.1	15.8	15.2	85.4	92.4	80.4	96.3
	6	21.0	17.4	14.6	14.0	13.0	83.3	83.3	95.9	92.9
Normal environmental temperature										
C.	7	15.5	12.2	10.1	8.9	8.4	78.7	82.8	79.6	94.9
without adding reserpine	8	30.0	23.8	21.4	20.0	19.0	79.3	83.3	85.3	15.2
D.	9	19.7	16.3	14.6	13.5	13.5	82.5	88.8	92.5	100.0
Adding 4 mg. reserpine/kg. ration.	10	24.0	20.5	17.0	16.5	16.0	84.4	88.9	97.1	96.9
	11	17.0	15.1	12.7	11.7	13.0	88.8	89.7	91.7	111.6
	12	14.9	12.7	10.7	11.0	19.7	85.5	98.3	102.8	99.7



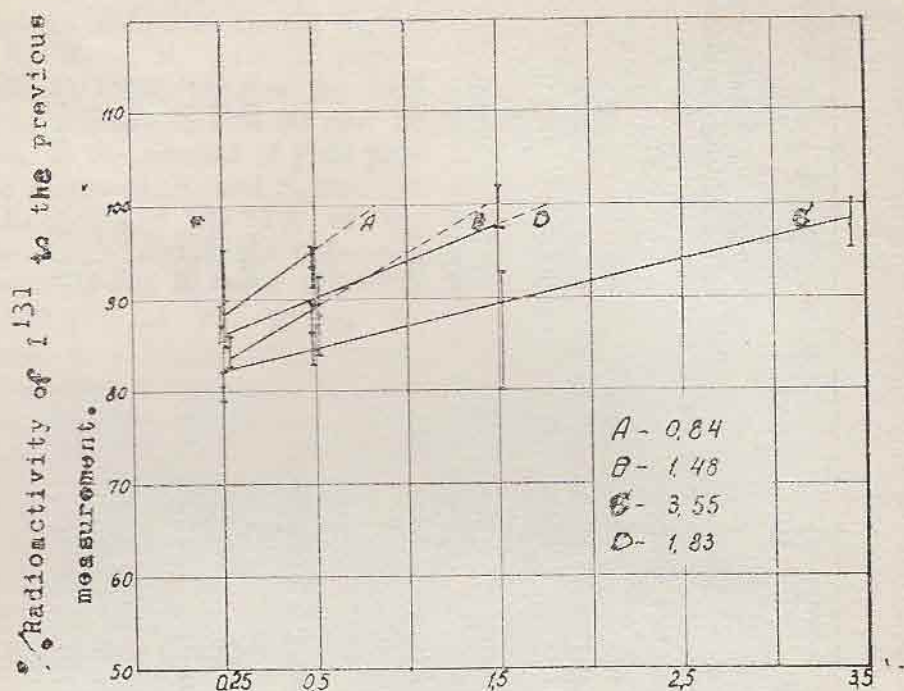


Fig. 2. L. Thyroxine ( $\mu\text{c.}/100 \text{ gm. body weight}$ )

Table 2. thyroxine secretion rate for different groups of chicks in ( $\mu\text{c.}/100 \text{ gm. body weight.}$ )

Group of Chicks	Thyroxine Secretion Rate		
	Max.	Min.	MEAN $M \pm m$
High environmental temperature			
A. Without reserpine.	0.92	0.56	$0.76 \pm 0.11$
B. Adding 4 mg. reserpine/Kg. ration	1.90	1.04	$1.41 \pm 0.25$
Normal environmental temperature			
C. Without reserpine.	4.50	2.60	$3.53 \pm 0.15$
B. Adding 4 mg. reserpine/Kg. ration	1.89	1.38	$1.72 \pm 0.17$

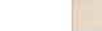
#### 1. Effect of High Environmental Temperature:

The results in table 2, indicate that thyroxine secretion rate dec-

reases under conditions of high environmental temperatures. The relationship between the thyroxine secretion rate (T.S.R.) and high























































environmental temperature was found to be highly significant ( $P=0.001$ ) These findings are in agreement with the results obtained by Schacher et. al. (1949).

## 2. Effect of Adding Reserpine:

The thyroxine secretion rate of the chicks, reared under high environmental temperature, showed a significant improvement ( $P=0.05$ ) when reserpine was added to the ration (Table 2). The thyroid radio-activity (T.S.R.) of the treated group was 84% over the (T.S.R.) of the control group. These findings are confirmed with the results obtained by Couch (1959) for broilers, reared under heat stress. While under normal environmental temperature, reserpine decreased the T.S.R. significantly (table 2). These findings are not in agreement with the results obtained by pre-machandra and Turner (1960). These

workers concluded that adding reserpine at different levels up to 20  $\mu\text{g}/100\text{ gm.}$  body weight stimulates the thyroid radio-activity. While Pokorny et al. (1957), Moon and Turner (1959) indicated that under normal thermal conditions reserpine decreased the thyroxine secretion rate of the chicks. The results obtained under the conditions of this experiment confirms these findings.

## 3. The Relation Between the Classical and Isotope Methods.

In order to clear this point, results of thyroid activity estimated by the two different methods were compared. The classical method was expressed by the help of histological investigation, while the other by using radio-isotope  $\text{I}^{131}$ .

The data in (Table 3) indicates distinctly that the more the thyroxine secretion rate is, the higher the epithelial tissue, and the wider

Table (3). Comparison of some historical characteristics with radio-activity of thyroids for different groups of chicks.

Group of chicks	Thyroxine secretion rate ( $\mu\text{c.}/100\text{gm.}/\text{day}$ ) $M \pm m$	Thickness of epithelial tissue (micron) $M \pm m$	Diameter of follicle (micron) $M \pm m$
High environmental temperature			
A. Without reserpine	$0.76 \pm 0.11$	$3.11 \pm 0.06$	$19.96 \pm 0.74$
B. Adding 4 mg. reserpine/ Kg. ration	$1.44 \pm 0.25$	$3.92 \pm 0.11$	$27.50 \pm 0.98$
Normal environmental temperature			
C. Without reserpine	$3.53 \pm 0.15$	$5.10 \pm 0.18$	$36.90 \pm 1.15$
D. Adding 4 mg. reserpine/ Kg. ration	$1.72 \pm 0.17$	$3.96 \pm 0.09$	$29.60 \pm 1.48$



the diameter of follicle is. The correlation between the diameter of follicle and the thyroxine secretion rate (radio-activity) was found to be high ( $r=0.97$ ) and the correlation between the T.S.R. and the thickness of epithelial cells was also high ( $r=0.98$ ). These indicate that radio-isotope method can efficiently be used in selection and obviates the necessity of slaying the chicks.

#### 4. Thyroid Radio-activity and Growth.

It is clear, that the main characteristics in selection is the rate of gain and growth. So, to find the relation between the thyroxine secretion rate and the body weight (growth) of the organism, measurements of thyroid radio-activity were taken for every chick individually (Fig. 3).

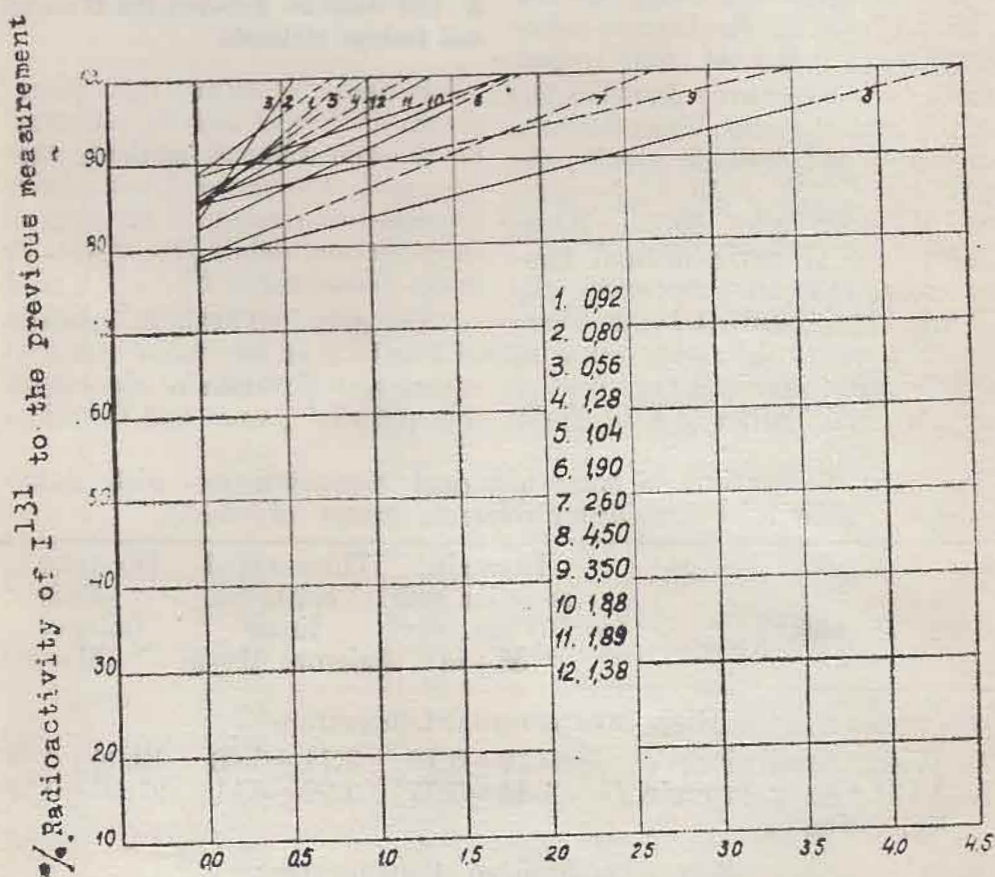


Fig. 3. 1 - Thyroxine (Mc./ 100 gm. body weight)

Thyroid radio-activity (T.S.R.) for every chick was compared with its body weight (Table 4).

Statistical analysis of the data in (table 4) shows a direct relationship between the body weight of the

Table (4) Comparison of the thyroxine secretion rate and the weight of every animal individually

Chicks No.	Body weight of chicks (gm)	Thyroxine secretion rate ( $\mu$ c./100 gm/day)	Chicks No.	Body weight of chicks (gm)	Thyroxine secretion rate ( $\mu$ c./100 gm/day)
1	1.425	0.92	7	1.720	2.60
2	1.400	0.80	8	1.730	4.50
3	1.370	0.56	9	1.740	3.50
4	1.500	1.28	10	1.590	1.88
5	1.350	1.04	11	1.630	1.89
6	1.500	1.90	12	1.710	1.38

chicks and their thyroxine secretion rate. The correlation coefficient is high ( $r=0.86$ ). These findings establish that thyroxine secretion rate of chicks obtained by using the isotope method can efficiently be used in selection and breeding.

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# A PROPOSED SOLUTION FOR AGRICULTURAL PROBLEMS IN IRAQ - A YOUNG FARMER EDUCATION PROGRAM

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## SUMMARY

Young farmer education is greatly recognized by many countries as a mean of increasing farming efficiency. The lack of this program in Iraq was one of the major factors for low crop yield. It is urgently recommended that such a program be initiated in Iraq to train the prospective young farmers who are at the present unaware of the modern techniques of agricultural practices.

## الخلاصة

شجرت كثير من الدول المتقدمة بأهمية التعليم الزراعي للشباب من أبناء الريف كوسيلة لرفع كفاءة الانتاج . ويعزى تاخر الزراعة في العراق الى عدم الاهتمام بمثل هذا النوع من التعليم . لذا نرى وجوب الابتداء بهذا المنهج التعليمي المنهني على مستوى الثانويات الزراعية لما له من أهمية في تطوير الزراعة في العراق ورفع المستوى المعاشي لأهل الريف وتحقيق الرفاهية العامة للبلاد ..

## INTRODUCTION

Vocational education in agriculture is the training of the present and prospective farmers for a proficiency in farming. It is designed to provide a systematic instruction carried on in schools or classes. The importance of young farmer education has been recognized greatly by many advanced countries such as the United States due to its successful outcomes which have been realized by the farmers themselves and by the authorities. The young farmer education program is completely lacking in vocational schools of agriculture in Iraq (3). Therefore, this paper was prepared

to discuss the aspects, needs, and objectives of such educational program so that agriculture may be improved through improving the ability and know-how of this large group of youth who are at present undervocationalized. Buringh (1960) reported that 67 percent of the Iraqi people are engaged in agriculture. Consequently, it is believed that such a training will result in an over-all professional improvement of such a large group of men who are at present unaware of the problems or the techniques of solving them.

## DISCUSSION

Iraq is unique in the Middle East. It has sufficient water, vast area of 181 million donums of which only 18.2 percent is used for agri-



cultural purposes at present(7). Haseeb (1963) reported that the average annual income per capita in Iraq for 1961 was 67.4 Iraqi Dinars.

Primitive farming is widely used. It is considered one of the main causes for low crop yield. For comparison, the table below shows the yield of main crops in Iraq, United States and United Arab Republic. (Figures are taken from the production year-book, 1963 F.A.O. Vol. 17, Rome, Italy, 1964).

Crop	Iraq	U.S.A.	U.A.R.
	Kg./Hectare		
Wheat	1,090	1,690	2,610
Barley	950	1,890	2,650
Corn	690	4,030	2,600
Rice	1,340	4,180	5,840
Cotton	230	510	660

However, improvement in agricultural practices has taken place during the last fifteen years mainly on experimental farms but not yet practiced by the farmers. Only about one-tenth of the land was affected by these improvements(7). Farmers are not fully aware of the potential for increasing out-put by the application of fertilizers. As a result, a fallow system especially in the rain-fed areas in the Northern part is being followed where half of the crop land is left fallow to restore soil fertility and moisture. In 1962, Iraq, imported only 8,505 metric tons of commercial fertilizers.<sup>7</sup> In the Southern part where crops are grown exclusively under irrigation, the land is left idle for

normal drainage in order to avoid the accumulation of salts as a result of water table rise.

Buringh (1960) reported that an estimated 150,000 Km. of main drainage canals are needed for Iraq to improve soil conditions. He also reported that only 20% of the Iraqi saline soils could be changed into very good soils, 40% into medium soils, and 40% into marginal soils.

The number of agricultural machinery in 1962 was 3024. About 67% of the farms have no mechanized equipment(7). No doubt that mechanization will become increasingly important but unfortunately it is hampered by many difficulties such as the need to train persons for operating and maintaining the equipment.

Extension service has been inadequate and has not yet developed among the farmers the proper use of land, water, and know-how in farming. Iraq, being an agricultural country, has only ten country agents among whom only seven having a college training in extension(1).

Prospective students, young and adult farmers are available if properly motivated. The Vocational education in agriculture is being offered at present in nine secondary schools but unfortunately none of them offers any training for adult or young farmers<sup>8</sup>. The established Vocational schools can render great services to such a group of farmers by planning for them a practical



instructional program in agriculture through evening classes, and on farm demonstrations as it is practiced in other countries.

The production and management of livestock are not carried out on scientific or economical basis. The 15.5 million heads of livestock in Iraq need great quantities of forage for growth and production. Considering the nutritional requirements estimated at a rate of 2.5 kilograms per head per day of dry forage, these animals need about 38 million kilograms of dry forage per day irrespective of TDN, protein, or mineral requirements (Springfield, 1957).

Forage production does not have prominent place in Iraq's agriculture. Less than 5% of the cultivated land is devoted to growing forages for livestock. This is a very small per cent compared with other countries where 20-75% of the cultivated land is planted by forage crops (Springfield, 1957). As a consequence of this shortage of forages, many livestock die from starvation

and exposure during severe winters.

The poultry situation is in no better shape than that of livestock. The Iraqi average annual production per bird is only 60 eggs in comparison with 250 eggs in the United States. Thousands of chickens die of malnutrition, Pullorum, New Castle, infectious Bronchitis and other diseases. In addition, the attitude of the villagers towards raising poultry is rather discouraging. However, the poultry picture is more promising in the cities. In the seventy six modern farms which have been established in the last five years in the Baghdad area, poultry is produced on commercial basis, and on relatively sound scientific methods<sup>4</sup>. A great amount of capital is invested for this purpose by both private growers and the government. In 1965 a General Poultry Company was established by the government with an initial capital of 2.5 million Iraqi Dinars. It was estimated that in summer of 1967 this company is expected to produce six million birds per year.

### RECOMMENDATIONS

1. A great number of young farmers are available in Iraq in all rural communities, some of them are established in farming, others who have given up schooling but are unexperienced in agriculture or related occupations. Therefore, it should be justifiable to initiate an educational program.
2. The areas of instructions should be related to occupational adjustments, management, study of farm problems, evaluation and analyzing of farm records, farming status and over-all professional improvement.
3. An emphasis should be placed on relating the young farmer training instructions so closely to the production enterprises and to try to relate it to the need according to the local situation and individual differences.



4. Learning by doing, demonstrations, actual participation, and group discussion should be considered in the educational program.
5. The program should aim to develop in farmers the ability in proper management of soil, water, livestock, poultry, machinery and marketing. As a

result of such upgrading in the professional ability of the young farmers an increase in agricultural production, a higher income for the farmer, and a higher national income will be reached. Hence it will result in the complete development of the young farmers to be good citizens.

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# EFFECT OF HIGH TEMPERATURE IN IRAQ ON SOME ECONOMIC CHARACTERISTICS IN TWO BREEDS OF CHICKENS

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## SUMMARY

The high atmospheric temperature in Iraq during Summer is one of the major factors influencing the decline of most of the economic characteristics of chicken. The two favourite breeds; Leghorn and New Hampshire were reared in two houses, one of which was cooled. The results are summarized in the following points.

1. Leghorn breed could withstand high temperature to some extent more than New Hampshire breed.
2. Lowering room temperature by cooling increased both egg production and egg weight in both breeds.
3. Feed consumption was much greater by breeds held in cooled houses.
4. Water consumption was much greater by breeds kept in uncooled houses.
5. July was the hottest month in Summer in which the effect of temperature was greatly observed.
6. Amount of feed consumed by birds differed according to breed and room temperature.

## الخلاصة

يعتبر ارتفاع درجة الحرارة خلال أشهر الصيف من العوامل المؤثرة على الصفات الاقتصادية للدجاج في العراق - أجريت هذه التجربة في حقل الدواجن التابع لكلية الزراعة في أمي غريب خلال صيف ١٩٦٦ على مائتي دجاجة نيوهامشير ولكهورن أبيض ووضع الدجاج في بيتين أحدهما مبرد والاخر اعتيادي وكل بيت كان يشكل كلا النوعين وبينهما حائط، وكانت النتائج كما يلي :-

- ١ - الدجاج المكهورن يستطيع تحمل الحرارة أكثر من النيوهامشير .
- ٢ - أدى خفض درجات الحرارة عن طريق المبردة الى زيادة في إنتاج البيض كذلك في وزن البيض في النوعين .
- ٣ - استهلك الدجاج في البيوت المبردة كمية من العلف أكبر من الدجاج في بيوت غير مبردة .
- ٤ - كانت الكفاءة الانتاجية للدجاج المبرد أعلى منها في الدجاج غير المبرد .
- ٥ - كانت كمية الماء المستهلكة أقل للدجاج المبرد .
- ٦ - كان شهر تموز أحر الشهور وتأثيره كبير على الصفات الانتاجية الاقتصادية للدجاج .

## INTRODUCTION

High environmental temperature characteristics in chickens. In Iraq the weather is very hot during the summer months. Iraq had a detrimental effect upon most of the productive and reproductive



suffers from a persistent and ever increasing shortage of meat and eggs. Therefore, it is of great importance to study how chickens suffer from high atmospheric temperatures during summer months. Very limited work has been done on that factor under Iraqi conditions. This research was carried out to study the effect of high temperature on egg production, egg weight, feed and water consumption during the hottest months in Iraq.

Graham (1930), found a relationship between temperature and egg production. Bennion and Warren (1933) found that extremely high or low temperatures were followed by a decline in egg production. Hays (1945) observed that declining house temperature below 40°F. from November to early January reduced egg production.

Lorenz and Almquist (1936) demonstrated that increasing air temperature during the formation period of the egg decreased egg weight. Warren (1939) showed that temperature was an important determining factor in egg size of domestic fowl. Skoglund *et al*

(1951) and Hutchinson (1953) showed a sharp decline in egg weight when the temperature was about 85°F.

Issawi and Amer (1958) and Amer (1964) reported that in Fayoumi there was a decline in both egg production and egg weight due to high temperature during summer months.

Bennion and Warren (1933), Bruckner (1936), Lee *et al* (1945) and Warren and Schnepel (1940) reported that laying hens exposed to high environmental temperature consumed less feed than similar groups held at moderate temperature.

Fox (1951) found that during heat stresses, a longer survival time was associated with the persistency with which a bird continued to drink water. The Single Comb White Leghorn showed more inclination to drink water at high temperature whereas the reaction of the R.I. Red and New Hampshire appeared to be reluctant to continue high water consumption throughout the exposure period.

#### MATERIALS AND METHODS

The research was conducted at the Poultry Farm, College of Agriculture, University of Baghdad. The experiment lasted for three months; June, July and August 1966. Two hundred pullets representing equal numbers of New Hampshire and S.C.W. Leghorn were used in the experiment. Half

of each breed was housed in an ordinary house, while the other halves were housed in cooled houses using an electric cooler (3000 cubic feet). Daily temperature in the houses, amount of feed and water consumed, daily egg production and average egg weight were recorded.



## RESULTS AND DISCUSSION

Table 1 represents the room temperature during the experimental period in both cooled and uncooled houses. It could be easily noticed that in cooled houses, temperature was lower than in uncooled ones by about 9.5°F. July was the hottest month in Summer and the temperature was 90.2°F. and 102.0°F. in cooled and uncooled houses, respectively.

Table 1: Average temperature during the period of study.

Months.	Average Cooled	Temperature uncooled
June 1966	86.5	95.7
July 1966	90.2	102.0
August 1966	87.5	94.0
Average	88.4	97.2

During August, temperature decreased by about 2.7°F. and 8.0°F. in the previous houses in the same order.

### Feed and Water Consumption:

Table 2 shows the quantity of feed in grams and that of water in gallons consumed by the birds. It could be observed that breeds differ in their feed and water consumption. New Hampshire pullets consumed more feed and water than Leghorn ones.

Pullets in cooled houses consumed more amount of feed and water than those kept in uncooled houses. Differences were 11.3 and 8.9 grams of feed for New Hampshire and Leghorns, respectively.

Table 2. Amount of feed and water consumed by the two breeds of birds.

Characteristics	Cooled		Uncooled	
	New Hamp.	Leghorn	New Hamp	Leghorn
Daily feed consumed/gm.	93.7	86.5	82.4	77.6
Water/gallon (all period)	3.47	3.26	3.60	3.45

With respect to water consumed, the differences were 0.13 and 0.19 gallons, in the same order. These results agree with those found by Bennion and Warren (1933), Bruckner (1937) and others who reported that laying hens exposed to high environmental temperature consumed less feed than similar groups held at moderate temperatures. During summer, when the weather

is very hot, birds continue to drink much water to compensate the loss occurring due to the high environmental temperatures (Fox, 1951).

The changes in feed and water consumption due to uncooling were calculated as percentages relative to the values obtained with cooled houses. The results are shown in table 3.

Table 3: Percentage changes in feed and water consumption in uncooled houses.

Characteristic	Uncooled	
	New Hampshire	S. C. W. Leghorn
Feed consumed/gram	-11.3 (-12%)	-0.80 (-10.0%)
Water consumed/gallon	+ 0.13 (+ 3.7%)	+ 0.19 (+ 5.8%)

From table 3, it could be noticed that the percentage decrease in feed consumption, due to high temperature, was lower with Leghorn birds than with New Hampshire birds reared in uncooled houses. Leghorn showed higher increase water consumption percentage than New Hampshire.

Table 3 also shows that birds

kept in uncooled houses consumed more water than those kept in cooled houses.

#### Egg Production and Egg Weight:

Egg production during the period of study, and the average egg weight in grams during the three months of study are tabulated in Table 4.

Table 4: Egg number and average egg weight in grams for the two Breeds of Birds.

Treatments.		Egg Weight and Egg Number				August	
		June		July		N.H.	Leg.
		N.H.	Leg.	N.H.	Leg.		
Cooled	No.	452	461	444	455	457	467
	Wt.	54.6	52.5	54.8	52.3	55.2	53.0
Uncooled	No.	415	422	318	360	427	393
	Wt.	52.2	50.2	50.1	49.6	49.9	49.9

Number of eggs laid by the pullets housed in the cooled houses differed according to breeds. Leghorn laid more eggs than New Hampshires. Decline in egg production in percentage due to uncooling as compared to cooled houses was calculated and shown in Table 5.

Table 5: Percentage of decline in egg production in uncooled houses compared with cooled ones.

Month	Leghorn	New Hamp.
June	7.6	8.2
July	20.9	28.4
August	15.8	6.5
Whole period	15.0	14.4



Variations in egg production were observed when a comparison was made among the three months of study. Table 6 shows the per-

centage of decrease or increase in egg production compared with the production of eggs during June.

Table 6: Variation in Egg production during July and August when compared with that of June.

Months	Leghorn birds		New Hampshire birds	
	Cooled	Uncooled	Cooled	Uncooled
July	- 1.3%	- 14.6%	- 1.8%	- 23.4%
August	- 1.3%	- 6.9%	+ 1.1%	+ 2.9%

It could be easily noticed that there was a decrease of 14.6% and 6.9% in the uncooled houses during July and August, respectively, with respect to Leghorn birds. During August, a slight increase was observed in egg production and this may be due to the decrease of high atmospheric temperature during this month when compared with July as shown in Table 1.

#### Weight of eggs:

The number of eggs laid and the weight in grams are reported in Table 4. It could be noticed that high atmospheric temperature affected egg weight and that eggs laid by birds in uncooled houses were fewer in number and small in size than those laid by birds kept in cooled houses. The variation in egg weight was much greater in New Hampshire than in Leghorn. This indicates that the Single Comb White Leghorn could withstand unfavourable temperatures. These results agree with those found by Lorenz and Almquist (1936) who

demonstrated that increasing of air temperature during the formation period of egg decreased egg weight. The results are also in agreement with those reported by Amer (1964).

#### Efficiency of feed utilization:

The amount of feed consumed by both breeds that give one dozen of eggs are calculated and shown in table 7.

Table 7: Amount of feed consumed that led to the Production of twelve eggs.

Treatments.	Amount of feed consumed in Kgs. to give 12 eggs	
	Leghorn	New Hampshire.
Cooled	3.450	3.816
Uncooled	3.642	3.918

It could be observed that New Hampshire birds consumed more feed to produce a dozen of eggs, when compared with Leghorn birds. Leghorn or New Hampshire reared



in cooled houses consumed less feed to produce one dozen eggs than those kept in uncooled houses.

From the foregoing discussion it is apparent that Leghorn birds can withstand high atmospheric temperature more than New Hampshire. This was shown by less decrease of feed consumption and

higher increase of water consumption with Leghorn birds kept in uncooled houses than with New Hampshire kept under the same conditions. Feed conversion values of Leghorn was also better than that of the New Hampshire kept under the same atmospheric conditions.

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## PRICE ANALYSIS OF RICE IN IRAQ

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### SUMMARY

Rice is one of the major summer field crops in Iraq. It has been contributing from 50% to 70% of the total value of summer field crops during 1953-61.

The principal objectives of this study were to: (a) Examine historical trends in rice price, and (b) Identify some of the factors influencing the price of rice.

The results of the study could be summarized, in order: (a) The net supply of rice increased by 40 index points, while its price declined by 24 index points during 1956-65. (b) Statistical relationships were found to be insignificant between price and net supply of rice. (c) Per capita production of rice was the major factor which had inversely influenced the price of rice. (d) Per capita production together with per capita real income explained 76% of the variations in the price of rice in Iraq. (e) The coefficient of price elasticity was found to be relatively high (-2.589). Therefore, increasing and stabilizing local production of rice will tend to reduce price fluctuations, exert a downward pressure on the price, and increase the total farm income from rice production.

### الخلاصة

يعتبر الرز من أهم المحاصيل الصيفية في العراق وقد بلغت قيمة حاصل الرز ٥٠٪ الى ٧٠٪ من القيمة الكلية للمحاصيل الصيفية خلال الفترة ١٩٥٣ - ١٩٦١ .  
أن من أهداف هذه الدراسة هي (١) فحص اتجاهات أسعار الرز بمختلف أنواعه خلال ١٩٥٦ - ١٩٦٥ و (٢) تشخيص بعض العوامل المؤثرة على سعر الرز في العراق .  
يمكن تلخيص نتائج هذا البحث كالآتي : (١) ارتفع صافي العرض من الرز بحوالي ٤٠٪ في الوقت الذي انخفضت الأسعار بحوالي ٢٤٪ خلال الفترة ١٩٥٦ - ١٩٦٥ (٢) ليس لصافي العرض تأثير يذكر على أسعار الرز (٣) أن حصة الفرد من إنتاج الرز كانت من العوامل الرئيسية التي أثرت في أسعار الرز بصورة عكسية (٤) لوحظ بأن الدخل الفردي وحصة الفرد من إنتاج الرز يفسر أن ٧٦٪ من التغيرات في أسعار الرز في العراق (٥) أن معامل مرونة الطلب بالنسبة للسعر كانت عالية نسبياً وتقدر بحوالي ٢٥٨٩ - . ولذلك فإن رفع مستوى إنتاج الرز والمحافظة على ثبات هذا المستوى يقلل من تقلبات الأسعار ويخفض من مستواها ويزيد من الدخل المزرعي .

### INTRODUCTION

Rice is one of the principal summer field crops in Iraq, contributing from 50% to 70% of the total value of summer field crops during 1953-61, (3).

Since rice is one of the basic

food stuffs in Iraq, an investigation to determine the impact of certain factors on the price of rice in Iraq was considered important. The factors examined in this study were net supply of rice, national income, and population.



## MATERIALS AND METHODS

The data included in this study covered the period 1956-65 and were secured from official records. Appropriate adjustments were made in the data whenever it was required. Historical trends in the supply of rice,

national income, population, and rice prices were reviewed for the years in the study. Correlation and regression techniques were used in addition to other statistical methods in analyzing the data.

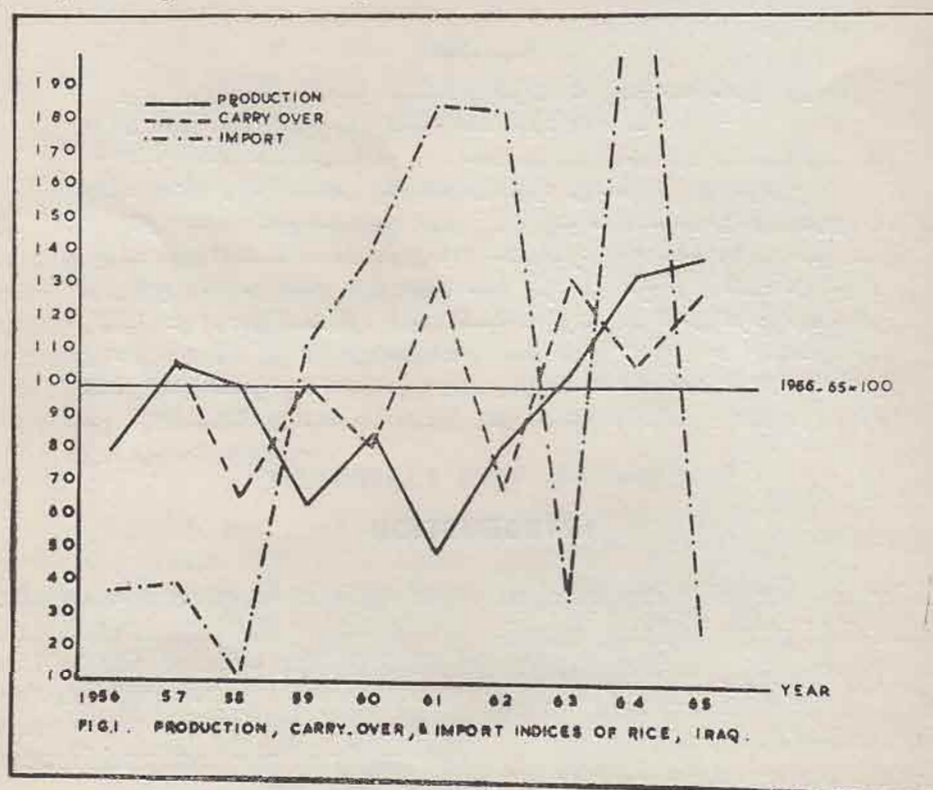
### THE SUPPLY OF RICE

The factors determining the net supply of rice in Iraq are domestic production, import, export, and carry-over.

#### PRODUCTION:

The production of rice fluctuated greatly during 1956-65, (Figure 1).

It declined from 78 thousand tons in 1956 to 48 thousand tons in 1961 and rose again to 139 thousand tons in 1965. The coefficient of variation around the 10 years (1956-65) average production worked out at 31%, i.e., the annual production of rice deviated from 1956-65 average





production by around one-third (Appendix 1). an important determinant of net supply.

#### IMPORTS:

Rice imports averaged about 38 thousand tons a year for the ten year period under study. The year to year variations were large, but a tendency to import more every year is increasing (Appendix 1). The coefficient of variation worked out at 87%. Figure I shows that the fluctuations in the imports were much greater than those in the production of rice.

#### EXPORTS:

Rice exports from Iraq increased from two thousand tons in 1956 to a little over three thousand tons in 1959, but during the last six years, only negligible amounts of rice were exported (Appendix 1). This indicates that exports were not at all

#### CARRY-OVER:

The average annual carry-over of rice was about 26 thousand tons during the years in the study. It increased from 20 thousand tons in 1956 to 33 thousand tons in 1965 (Appendix 1). The coefficient of variation around the 10-years average was 26%.

#### NET SUPPLY:

The net supply increased by about 40% (1956-65=100) during the years covered by this study (Appendix 1). To study its possible effect on prices of rice, an examination of changes in demand factors (population and the purchasing power of the people) would appear necessary.

### POPULATION AND THE NATIONAL INCOME

The population of Iraq increased by 17% during 1956-65 (Appendix 2). This is expected to increase the demand for rice in Iraq. An increase of about 47% (1956-65=100) in the national income during the same period should exert additional pres-

sure to inflate the demand for rice. The extent of increase in demand, however, is not known.

The effect of the relative changes in demand and supply of rice on the price of rice is examined in the following sections.

#### PRICE ANALYSIS<sup>1</sup>

During 1956-62, price indices in 1958, when it fell to a low of ranged between 104 and 106; except 86.5, and in 1961, when it reached

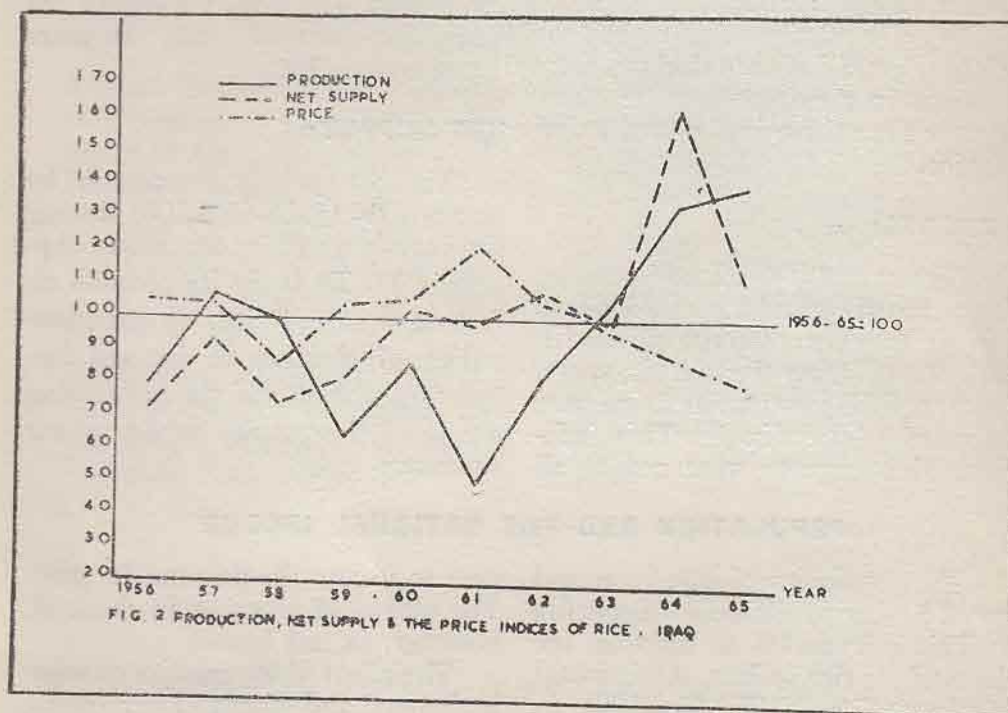
(1) Due to a lack of data for Iraq as a whole, the prices of different kinds and grades of rices which were sold in Mosul, Baghdad, and Basrah markets were utilized in this study. Since the quantity data for different types and grades of rice were not available to compute average weighted prices, average price indices were estimated from the price relatives of the individual types and grades of rice.



an all-time high figure of 122.3. Following 1961, there has been a continuous fall in the prices, touching an all-time low figure of 81.1 in 1965. The coefficient of variations around 1956-65 worked out at 12% (Appendix 4).

Prices have followed a similar pattern of change as those in the quantities of net supply during

1956-65. The years which followed 1960 showed a certain degree of inverse relationship between price and the net supply (Figure 2). However, the inverse relationships between price and the production of rice could readily be recognized during the years in the study. (Figure 2).<sup>2</sup>



### STATISTICAL ANALYSIS

Due to a lack of time, an attempt was made to simplify the analysis by considering three variables at a time; price, supply, and income.

For this reason, total net supply and total national income were deflated by the population of Iraq (Appendices 2 and 3).<sup>3</sup> Furthermore, the im-

(2) Attempt was made to examine the correlation of supply and production in a particular year with the prices in the following year, but the computed correlation coefficients were relatively low compared to those computed for the same year.

(3) Since the exported quantities of rice were insignificant during the years in the study, it was excluded from the analysis.



pact of the general rise in prices was removed from the price data by deflating current prices by the consumer price index.<sup>4</sup>

The general form of the equation which was fitted to the data by single-equation least squares techniques was as follows:

$$(1) Y_1 = a + b_1 X_1 + b_2 X_2$$

$X_1$  = per capita net supply of rice

$X_2$  = per capita real income  
(Iraqi Dinar per person)

$Y_1$  = Price index of rice

The results of the analysis showed that the per capita net supply and per capita income have explained only 6% of the variations in the price of rice.<sup>5</sup> This was attributed

$$(2) Y_1 = 140.570 - 2.848X_1 - 0.043X_2$$

$$R^2 = 0.76 \quad (-2.977) \quad (-0.148)$$

Where:  $Y_1$  and  $X_2$  are the same as in equation 1.

$X_1$  refers to the per capita production of rice.

The substitution of the per capita production for the per capita net supply in Equation 2 appears to

to a high intercorrelation between the independent variable (net supply and income). For this reason an attempt was made to find the degree of relationships between price and individual components of the net supply of rice.

The size of the simple correlation coefficient between price and the per capita production was found to be greater than those between price and the other components of the net supply.

Therefore, the price index was set as a function of the per capita production and the per capita income. The new equation becomes as follows: The figures in parentheses are t values

have improved its predictability greatly.<sup>6</sup> The multiple correlation coefficient of 0.76 indicates that the

(4) Due to a lack of data for Iraq as a whole, the consumer price index for the unskilled workers in the city of Baghdad and its environs was used as a price deflator.

(5)  $Y_1 = 113.849 - 0.5922X_1 - 0.0088X_2$ ,  $R^2 = 0.06$ ;  $(-0.50)_{11}$ ;  $(-0.012)_{12}$ . The values in parentheses are t-values.

(6) This situation led the authors to collect additional information relative to the quantities of the carry-over and import data. It was found that the quantities of the estimated carry-over include the quantities of the seeds stored for the following growing season. The quantities of the seeds comprise the largest percentage of the total carry-over. Therefore, the carry-over of rice may have little if any effect on the price of rice.

Furthermore, the quantities of imported rice which have been recorded in the official records appear to be subject to a sizable error, because they have been based upon the import permits given to merchants. The quantities of imported rice may not be directly correlated with the number of import permits, since a good number of import permits may remain unutilized at the end of the year.

It also appears that the market of imported rice has been highly regulated by certain government agents (Iasha.) While the market for imported rice is controlled, the market for the locally produced rice is left to the private sector of the economy. Therefore, the market for the locally produced rice may differ greatly from that for the imported rice. This may justify the exclusion of imported rice from the price analysis of the locally produced rice.



per capita production and the per capita income account for 76% of the variations in the price of rice. That is only 24% of the variations in price were due to factors not included in the above equation.

The regression coefficient attached to the production variable ( $X_1$ ) is preceded with a negative sign, as expected, denoting inverse relationships between price and the production of rice. The regression coefficient of  $-2.848$  means that a change of one kilogram in the per capita production of rice is associated with about 3 index points of rice price in opposite directions, other things are equal.

The regression coefficient of the per capita production is significantly

different from zero at 5% probability level, while that of the per capita income is not significantly different from zero at 5% probability level.

Coefficients of price flexibility and elasticity of demand were computed at the means of the series. The flexibility of price with respect to the per capita production is 0.386. Thus a 10% change in per capita production is associated with a 4% change in the price index in the opposite direction. The inverse of the coefficient of the price flexibility with respect to production (supply) provides an estimate of the price elasticity of demand of  $-2.589$ . The income elasticity implied by the equation is  $-1.60$ .<sup>7</sup>

### DISCUSSION

The preceding analysis reveals that the net supply of rice has increased by 40 index points during 1956-65. The increase in the net supply of rice appears to have been accompanied by a decline in its price during the same years (Figure 2). The price index of rice has declined by 24 index points in 1965 compared to that in 1956. However, the statistical analysis showed that the relationships between price and the net supply to be insignificant.

Further analysis indicated that the domestic production of rice has been the main factor which has influenced the price of rice. The production of rice has increased by 58

index points (1956-65 = 100) during the years indicated above.

Fluctuations in price have been inversely correlated with the production. The production coefficient of variation was 31% while that of the price was 12%. Thus, it appears that the price variations have been moderate compared to that in the domestic production of rice.

The results of the statistical analysis showed that the price has been positively correlated with the quantities of the carry-over and imported rice. However, under normal conditions, the larger the quantities of the carry-over and import, the lower prices are expected to be.<sup>8</sup>

(7) Since the standard error attached to the income coefficient is relatively high, its reliability is questionable.

(8) See footnote 6.



The coefficient of price flexibility with respect to the per capita production was  $-0.386$ . This implies that a 4% change in the price has been associated with a 10% change in the per capita production of rice in opposite directions. Elasticity of demand implied by the price flexibility is  $-2.589$ . This means that an increase in the per capita production tends to raise the level of total revenue secured from the production of rice. Thus an attempt to increase the per capita production of rice tends to:

- a. Exert a downward pressure on the price of rice.
- b. Increase the total expected income from rice production.
- c. Reduce the amount of hard currency spent on importing rice.

Based on the projected values of the per capita production and the per capita income, the price is expected to be 83 index points in 1975.<sup>9</sup>

It must be remembered that the downward trend in rice price is possible only under *ceteris paribus*

conditions. Changes in the factors which have been assumed constant tend to upset the course of the predicted future price. For instance, a sharp cutback in rice import will tend to exert an upward pressure on the price of the domestically produced rice unless the domestic production has been increased by equal amount. During 1964-65, the quantities of the domestically produced rice has increased by about 10 thousand tons, while the import was cut back from 95 thousand tons to about one thousand tons of rice. Consequently, the price of certain types of rice rose by more than 50% during the first half of the year 1966 (5). Therefore, in order to avoid sharp increase in the price of rice, the cutback in the import must be matched with equal increase in domestic production.

The rate of increase in the production of rice could be accelerated by implementing new ways and means in rice production (6). Fertilizer used on paddies has already shown promising results in certain parts of the country (6) and (8).

### SUMMARY

Rice is one of the major summer field crops in Iraq. It has been contributing 50% to 70% of the total value of summer field crops during 1953-61.

The principal objectives of this study were to: (a) examine historical trends in rice price, and (b)

identify some of the factors influencing the price of rice.

The results of the study could be summarized as follows: (a) The net supply of rice increased by 40 index points, while its price declined by 24 index points during

(9) If the increase in the per capita production and the per capita real income continues at the 1956-65 rates, they are expected to become 19 kilograms and 97 dinars, respectively in 1975 (Appendix 1).



1956-65; (b) statistical relationships were found to be insignificant between price and net supply of rice; (c) Per capita production of rice was the major factor which had inversely influenced the price of rice; (d) Per capita production together with per capita real income accounted for 76% of the variations in the price of rice in Iraq. (e) The coefficient of price elasticity was found to be relatively high ( $-2.589$ ). Therefore, increasing and stabilizing local production of rice will tend to reduce price fluctuations, exert a downward pressure on the price, and increase the total farm income from rice production.

Appendix 1. Total Production, Carry-Over, Import, Export, and Net Supply of Rice in Iraq, 1956-65.

(Thousand Tons)

Year	Production <sup>a</sup>	Carry-over <sup>b</sup>	Import <sup>a</sup>	Export <sup>a</sup>	Net Supply
1956	77.58	20.32	14.67	1.88	110.69
1957	103.05	27.59	15.15	2.71	143.08
1958	95.88	16.80	4.02	2.44	114.26
1959	61.66	25.70	42.56	3.26	126.66
1960	82.83	20.81	53.34	0.10	156.88
1961	47.92	33.83	69.69	0.02	151.42
1962	79.17	17.70	69.16	0.00	166.03
1963	100.25	34.00	13.49	0.00	147.74
1964	129.04	27.00	95.03	0.01	251.06
1965	138.90	32.78	1.00	0.00	172.68
Ave.	91.63	25.65	37.81	—	154.05
C.V. <sup>c</sup>	30.63	25.61	86.70	—	25.86

Sources: (a) Ministry of Planning, Central Bureau of Statistics, **Statistical Abstracts, 1956-65**, Baghdad, Iraq. In order to convert unhusked rice to husked rice, the original data were adjusted downward by 30%.

(b) The carry-over estimates are based upon an unpublished report collected from the Grain Board and the Ministry of Economics, Baghdad, Iraq.

(c) The C.V. denotes Coefficient of Variation around 1956-65 average values in the series.



## Appendix 2: Population and National Income of Iraq, 1956-65.

Year	Population (Mil. People) <sup>a</sup>	National Income (Mil. I.D.) <sup>b</sup>	Per Capita Income (I.D.)
1956	6.3	335	53.1
1957	6.4	348	54.4
1958	6.6	363	55.0
1959	6.7	369	55.0
1960	6.8	413	60.7
1961	6.9	469	67.9
1962	7.1	503	70.9
1963	7.3	490	67.1
1964	7.4	517	69.8
1965	7.5	538	71.8

Source: (a) Population estimates have been based on the general population census for the years 1957, 1947, and 1934, Bureau of Population, Baghdad, Iraq. The basic data used for the at the time census was taken.

population estimates excluded the nomadic population and those people who were abroad  
(b) National Income estimates have been based on the 1963 Annual Report of the Central Bank, Baghdad, Iraq. The national income estimates have been expressed in terms of constant price (1958=100).

## Appendix 3: Per Capita Production, Carry-over, Import, and Net Supply, Iraq.

Year	Production Kg	Carry-Over Kg	Import Kg	Net Supply Kg
1956	12.4	3.2	2.3	17.7
1957	16.1	4.3	2.4	22.3
1958	14.7	2.6	0.6	17.5
1959	9.2	3.9	6.4	19.0
1960	12.2	3.1	7.8	23.0
1961	6.9	4.9	10.0	21.8
1962	11.2	2.5	9.8	23.4
1963	13.9	4.7	1.9	20.4
1964	17.5	3.7	12.9	34.1
1965	18.5	4.4	0.1	23.0

Source: Adapted from Tables 1 and 2.

Appendix 4. Actual and Estimated Price Index, Production and Income,  
Iraq.

Year	Price Index (1956-65=100)		Per Capita Production		Per Capita Income (ID. person)	
	Actual*	Estimate*	Actual (kilos)	Estimate <sup>b</sup> (kilos)	Actual	Estimate <sup>c</sup>
1956	104.7	103.1	12.4	11.7	53.1	51.8
1957	104.1	92.4	16.1	11.9	54.4	54.2
1958	86.5	96.5	14.7	12.3	55.0	56.6
1959	104.1	111.9	9.2	12.7	55.0	59.0
1960	106.0	103.3	12.2	13.1	60.7	61.4
1961	122.3	118.0	6.9	13.4	67.9	63.8
1962	104.7	105.7	11.2	13.8	70.9	66.1
1963	99.0	98.2	13.9	14.2	67.1	68.5
1964	88.6	87.6	17.5	14.6	69.8	70.9
1965	81.1	84.7	18.5	14.9	71.8	73.3
1975	—	83.2	—	18.7	—	97.2

(\*) Source: Same as Footnote a, appendix 1.

(a) Estimated from Equation 3.

~~(b) Based on:  $Y_1 = 11.19 + 0.374X_1$ ;  $R^2 = 0.13$ ;  $t = 0.292$~~

(b) Based on:  $Y_1 = 11.19 + 0.374X_1$ ;  $R^2 = 0.13$ ;  $t = 0.292$

Where:  $Y_1$  = Per capita production (kilogram per person)

$SX_1$  = Years (1965 = 1... 1965 = 10.)

(c) Based on:  $Y_1 = 49.44 + 2.387X_1$ ;  $R^2 = 0.88$ ;  $t = 7.70$

Where:  $Y_1$  = per capital Income (ID. per person)

$X_1$  = same as in above equation



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## SOME CHARACTERISTICS OF GOOD HIGH SCHOOL TEACHERS

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### SUMMARY

There was no general agreement as to what were the specific characteristics of good teachers as indicated by research for the past fifty years. However, careful selection and better pre-service preparation for college students will offer to the high schools, young men and women better able to meet the demands for successful teaching.

### الخلاصة

لم يتفق المربون على ماهية وصفات المعلم الناجح رغم مرور نصف قرن على مواصلة البحث لمعرفة هذه الصفات المرغوبة في المعلم الناجح . ومع هذا فإن تحضير وإعداد طلاب الكلية لهذه المهنة ستقدم للمدارس الثانوية المعلمين والمعلمات القادرين على تأدية التدريس بنجاح .

### INTRODUCTION

The recruitment and selection of qualified teachers for the secondary school are the concern of professional people responsible for this level of education. Since we are facing the problem of teacher shortage on one hand and the demand for excellence in education on another, the recruitment, selection, and improvement of desirable young people for the profession of teaching became very essential in order to attain the desired quality product of learning. Although there was no agreement as to what constituted a good teacher there appeared to be some characteristics which might serve as the basis for recruitment, selection, and improvement of teachers.

### MATERIALS AND METHODS

This is a library research conducted through the review of available literature.

### REVIEW OF LITERATURE

Teacher characteristics have been investigated by many research workers using varieties of methods and instruments. In a study he directed Ryans (6) tested three patterns of teacher behavior which, he reports, appeared to stand out in separate factor analyses of elementary and secondary teacher data. *These patterns were the following:*

X<sub>0</sub>— warm, understanding, friendly vs. aloof, egocentric, restricted teacher behavior.



Y<sub>o</sub>— responsible, businesslike, systematic vs. evading, unplanned, slipshod teacher behavior.

Z<sub>o</sub>— stimulating, imaginative, surgent vs. dull, routine teacher behavior.

In comparing groups of teachers with respect to these patterns Ryans (6) reports the following findings:

1. Among elementary school teachers, the patterns X<sub>o</sub>, Y<sub>o</sub>, and Z<sub>o</sub> were highly correlated, and each also seemed to be highly correlated with pupil behavior in teachers' classes. Among secondary school teachers the intercorrelated of the patterns were less high and much less highly correlated with pupil behavior.

2. Among elementary school teachers, patterns X<sub>o</sub>, Y<sub>o</sub>, and Z<sub>o</sub> tended to be higher for married than for single teachers. Among secondary school teachers the patterns tended to be higher for single than for married teachers.

3. The patterns did not vary significantly when teachers were classified according to scores on the several scales of the Minnesota Multiphasic Personality Inventory and the Allport-Vernon Study of Values. However, the "dominant" and "sociable" scales of the Thurstone Temperament Schedule did distinguish between teachers with respect to Pattern X<sub>o</sub> (warm, friendly) and Pattern Z<sub>o</sub> (stimulating). the more highly assessed teachers tending to attain higher scores on the Thurstone Temperament Schedule scales.

Ryans also reports that certain dimensions of teacher attitudes, verbal understandings, educational viewpoints and emotional adjustment were investigated. Some of these trends reported were the following:

1. The attitudes of elementary teachers toward pupils, toward administrators, and also toward fellow teachers and nonadministrative personnel in the schools were markedly more favorable than were similar attitudes of secondary teachers.

2. Actual pupil behavior in the classroom (based on observers' assessments) did not appear to be related to the attitude held by teachers.

3. The educational viewpoints expressed by secondary teachers were of a more traditional or learning-centered nature, while those of elementary teachers learned more in the direction of permissiveness.

4. The verbal understanding scores obtained by secondary teachers were significantly higher than those of elementary teachers, English and foreign language teachers excelling other subject-matter groups within the secondary school.

5. Men teachers at both the elementary and secondary levels appeared to be markedly more emotionally stable than women teachers.

By employing the teacher Characteristic Schedule, Ryans (6) found that: X<sub>o</sub> warm and understanding, Z<sub>o</sub> stimulating, and -B<sub>o</sub>



permissive to be highly correlated among elementary teachers, suggesting a factor contributed to by friendly and stimulating teacher behavior combined with permissive, child-centered educational viewpoints. There also was a tendency for  $Y_{co}$ ,  $R1_{co}$ , and  $Q_{co}$  to be interrelated, suggesting a factor made up of organized teacher behavior and favorable opinions on the part of teachers regarding other persons. These trends were somewhat less evident among secondary teachers, but the  $X_{co}$  and  $-B_{co}$  combination (friendly, warm behavior, and permissive educational viewpoints) seemed again to be very much in evidence in one factor, and  $Y_{co}$  (businesslike, well-organized teacher behavior) appeared also to be prominent in a second major pattern. Ryans (6) also reports the following comparisons of teachers in the light of Estimated Characteristics:

### 1. In relation to age:

The implication for research and practice in the area of teacher personnel probably is that age must be taken into account as a relevant independent variable whenever teacher characteristics are considered; that concerning personality, teacher variation with age interacts with the main effects sometimes described as contributors to teaching performance, and may either make difference in such main effects appear important when they do not exist or obscure them when they really are present.

### 2. In relation to experience

Trends with regard to extent of teaching experience are not substantially different from those noted when teachers were classified according to age. There was a general tendency for teachers with extended experience to score lower than less experienced teachers on most of the Variables.  $Y_{co}$  (responsible, business-like behavior in the classroom), however, was a notable exception: in this case the more experienced teachers scoring significantly higher than the less experienced.

### 3. In relation to sex:

At the elementary school level, men and women teachers differed in only four of the personal-social characteristics studied; men were less responsible and businesslike in classroom behavior and more favorable toward democratic classroom practices, more inclined toward permissive, child-centered educational viewpoints, and more emotionally stable than women. At the secondary school level, differences between the sexes were fairly general and pronounced with women tending to attain significantly higher scores on the seven measuring friendly, responsible, stimulating classroom behavior, favorable attitudes toward pupils, democratic classroom practices, permissive educational viewpoints, and verbal understanding. Men teachers scored significantly higher in emotional stability, however.



#### 4. In relation to Marital status

There are systematic differences between married and unmarried teachers with respect to various classroom behaviors and attitudes, but these differences often vary according to school level, grade and subject taught.

#### 5. In relation to professed avocational activities:

Teachers who report frequent participation in any avocational activities (gardening, chess or cards, painting, sculpting, music...) tend, as a group, to score higher on  $X_{10}$ ,  $Y_{10}$ ,  $Z_{10}$ ,  $R_{10}$ ,  $R_{10c}$ ,  $Q_{10}$ ,  $-B_{10}$ , and  $S_{10}$  than teachers who do not report in any of these activities.

#### 6. In relation to type of undergraduate college attained:

Very few significant differences were found with respect to type of school attended.

#### 7. In relation to academic success:

Teachers who reported having been outstanding students scored higher than other groups on most scales including friendly, responsible, stimulating classroom behavior, and favorable attitudes toward pupils, democratic school practices, and the like. The only exception to this trend had to do with emotional stability.

The more notable differences between the high and the low teachers, as reported by Ryans (6), are the following:

#### a. High School teachers tend to be:

1. extremely generous in appraisals of the behavior and motives of other persons;
2. possess strong interest in reading and library affairs;
3. interested in music, painting, and arts in general;
4. participate in social groups;
5. enjoy pupil relationships;
6. prefer nondirective (permissive) classroom procedures;
7. manifest superior verbal intelligence; and
8. superior with respect to emotional adjustment.

#### b. Low teachers tended generally to be:

1. restrictive and critical in their appraisals of other persons;
2. prefer activities which did not involve close personal contacts;
3. express less favorable opinions of pupils;
4. manifest less high verbal intelligence;
5. show less satisfactory emotional adjustment; and
6. represent older age groups.

On qualities demanded in teachers, Stiles (8) reports the following:

"Traits and abilities judged essential for successful teaching have been classified into two categories. One includes skills and knowledge pertaining to psychological principles of teaching competence in the liberal arts generally and in the subject matter to be taught, as well as mental abilities. The other category includes the teacher's effectiveness in promoting good working conditions with pupils, his patterns of interests and commitments, and his personal adjustment. Although the categories are not mutually exclusive, for traits and abilities in one category influence those in the other, they do pro-



wide framework for assessing the qualities likely to be important to teaching effectiveness."

Stiles also reports that through scientific procedures, researchers have been able to isolate the abilities and traits which distinguish between effective and ineffective teachers and states that Schultz and Ohlsen applied procedures used in the study of experienced teachers to a group of student teachers. Their findings, Stiles (8) reports, were the following:

"The outstanding student teacher... was a creative person who had an abundance of initiative and enthusiasm. He had a genuine interest in his pupils and a positive attitude toward teaching. He was able to adapt to new unforeseen situations. In his classroom, his work was well organized. This ability to organize and plan was combined with a good understanding of the teaching-learning process, a knowledge of his subject matter and a knowledge of teaching methods. He understood his students and was able to involve them in classroom in such a way as to promote and hold their interest."

Another study, conducted with student teachers, revealed abilities and traits which distinguish the effective student teachers from the ineffective. This study (8) revealed the following findings:

Discriminatory traits of Best student teachers

1. Imagination and resourcefulness. 2. Organisation and planning. 3. Explanation of ideas. 4. Leadership. 5. Maturity. 6. Identification. 7. diagnosis of learning problems. 8. Understanding of students. 9. Quickness in assessment, reaction.

Motivation ability. 10. Initiative. 11. Exercise of good judgment.

In a study conducted on the teaching performance of good and poor teachers of social studies Barr (3) listed some 17 qualitative differences in performance. But while these differences in the teaching performance of good and poor teachers are significant, there were no qualities, with the probable exception of motivation, discipline, and knowledge of subject matter, possessed by all good teachers that were not possessed by some poor teachers and vice versa, Barr (3) reports.

From description of a typically good and a typically poor teachers of social studies Barr (3) reports that weaknesses most frequently associated with poor teacher are under the following categories:

1. Knowledge of subject matter;
2. Technique of teaching;
3. Personal characteristics, and
4. Discipline

Barr (3) also mentioned the following list as the most frequently characterized the teaching of good teachers:

1. Ability to stimulate interest
2. Wealth of commentarial statements
3. Attention to pupils while reciting
4. An effective organization of subject matter
5. Well-developed assignments
6. Use of illustrative materials
7. Provision for individual differences
8. Effective methods of appraising the work of pupils
9. Freedom from disciplinary difficulties
10. Knowledge of Subject Matter.



11. Knowledge of the objectives of education
12. Conversation manner in teaching
13. Frequent use of the experiences of pupils
14. An appreciative attitude, evidenced by the teacher's nods, comments and smiles
15. Skill in asking questions
16. Definite directions for study
17. Skill in measuring results
18. Willingness to experiment.
4. Insistence on high standards
5. Sympathy
6. Interest in students
7. Expressive voice
8. Cordiality
9. Patience
10. Impressive physique
11. Tolerance
12. Enjoyment of teaching

As to practices those teachers adapted, Lathrop,(4) reports the following in order of their frequency:

1. Use of effective illustration
2. Provision for the activity of the learner
3. Careful preparation for each teaching exercise
4. Encouragement of efforts of students
5. Drawing upon fields other than the special field
6. Statement of all sides of a question
7. Avoiding adherence to the text
8. Provision for teaching students to think
9. Seizing upon a few essentials
10. Iteration and reiteration

Avent(2) in a survey conducted on the attitudes and traits of teachers, compiled 1002 lists submitted by 1002 teachers in 45 States concerning the excellences and errors in teaching. The following are the main points of excellences in teaching reported in this study.

#### A. Attitudes of teachers toward:

##### 1. Discipline

- a. The conceptions of discipline
- b. The practice of disciplinary measures
- c. The attitudes toward offenses
- d. The attitudes toward punishment

In a study on a variety of measurable traits in selecting people for the profession of teaching Morris (5) reports that probable success in teaching is a matter of favorable proportions of the several measured characteristics which are common to all students, rather than a matter of a particular combination of certain qualities possessed by only some students. Measures of intelligence, academic achievement, health (not only in a "physical" sense, but also in the "mental" aspects colored by emotional breadth, intensity, and stability), and the personal qualities gauged by Trait Index-L (used by the author) are all important.

a search for description of teachers by their students was directed by Lathrop (4). He believes that a study of the 50 great teachers of the past may have value for teachers of to-day.

Lathrop(4) reports the following characteristics which have been ascribed to largest number of the 50 teachers, in the order of frequency:

1. Clarity of expression
2. Humor
3. Enthusiasm



## 2. Teaching work

- a. appraising one's methods
- b. willingness to experiment as to the best method
- c. The safe attitude toward facts or claims
- d. the right attitude toward failures
- e. the honorable attitude toward mistakes
- f. the scientific attitude toward new ideas
- g. correct attitudes toward the teaching work itself

## 3. School management

- a. making the best of conditions found
- b. adapting one's self to the system
- c. complying with school regulations
- d. fostering school program

## 4. Subjects taught

- a. having a love and an interest in them
- b. recognizing subject-matter as means
- c. desire for further mastery of the subjects

## B. Traits of teachers

### 1. Certain fundamental traits

- a. capacities or abilities
  1. teaching ability
  2. managerial ability
  3. sound scholarship
  4. ability to use good teaching methods
  5. ability to profit by experience
  6. thinking ability
  7. legal ability to teach
- b. professional training
- c. experience
- d. plans
  1. policy of plans
  2. plans for the first day
  3. plans for the term or year
  4. daily plans

## 2. Personality traits

- a. address
- b. dignity
- c. enthusiasm
- d. fairness
- e. optimism
- f. personal appearance
- g. scholarship
- h. sincerity
- i. sympathy
- j. vitality
- k. courtesy
- l. generosity

### 3. Certain personal traits

- a. character traits
  1. adaptability
  2. appreciation
  3. "common sense"
  4. conviction
  5. dependability
  6. independence
  7. force
  8. individuality
  9. originality
  10. patience
  11. poise
  12. purpose
  13. responsibility
  14. vision
- b. other personal traits
  1. the use of good English
  2. agreeableness of manner
  3. satisfaction
  4. discrimination
  5. animation
  6. outside interests
  7. democracy
  8. control of temper

### 4. Social traits

- a. congeniality
- b. conversation
- c. friendliness
- d. a sense of humor
- e. kindliness
- f. good manners
- g. politeness
- h. wise tolerance



- i. tact
- j. loyalty

### 5. Scholarship traits

- a. general culture
- b. learning
- c. mastery
- d. growth
- e. improvement
- f. open-mindedness
- g. disposition to suspend judgment
- h. reading
- i. broad-mindedness
- j. considering factual values in relationship
- k. good thinking

### 6. Moral traits

- a. confidence
- b. consistency
- c. courage
- d. determination
- e. faith
- f. honesty
- g. honor
- h. personal integrity
- i. truthfulness
- j. trustworthiness
- k. persistence

### 7. Physical traits

- a. health
- b. good physical condition
- c. pleasing facial expression
- d. good teaching posture
- e. good teaching position in the classroom
- f. recreation

### 8. Business traits

- a. business ability
- b. economy

### 9. Professional traits

- a. professional ethics
- b. the teacher as a student
- c. professional growth
  - 1. continuing growth

- 2. reading and study
- d. professional education
- e. professional contribution

### 10. Efficiency traits

- a. personal efficiency
  - 1. excellent vocabulary
  - 2. correct pronunciation
  - 3. distinct enunciation
  - 4. legible writing
- b. daily efficiency
  - 1. careful daily preparation of lessons
  - 2. careful planning of work
  - 3. careful planning of each day's work
  - 4. careful plans for each lesson
  - 5. note-taking
- c. general traits of efficiency
  - 1. preparation for the first day of school
  - 2. adjustment
  - 3. accuracy
  - 4. alertness
  - 5. care
  - 6. experimenting
  - 7. foresight
  - 8. initiative
  - 9. Judgment
  - 10. Practicalness
  - 11. resourcefulness
  - 12. having a time budget
  - 13. teaching efficiency
  - 14. evaluating one's own work
  - 15. firmness in dealing with pupils
  - 16. observing other teachers
- d. study by the teacher
  - 1. study of the community
  - 2. study of difficulties and problems
  - 3. observation of the children
  - 4. study of the children

The evaluation of teaching is accepted in the Cincinnati Public Schools as a definite responsibility calling for careful planning. The plan in use is described as a repre-



sentative of the prevailing attempt to humanize the judgment of teacher effort. The plan consists of 44 desirable teaching qualities which are divided into three classifications. These qualities, as reported by Spears(7) are listed as follows:

# **I. Personal qualities and performance**

## **A. staff relationships**

1. promotes friendly intraschool relationships
2. adjusts easily to changes in procedure; does not consider his own program all-important
3. carries a fair share of out-of-class responsibilities.
4. accepts criticism or recognition gracefully
5. accepts group decisions without necessarily agreeing
6. uses discretion and consideration in speaking of his school or colleagues
7. cooperates with immediate administration and supervisors

## **B. Community relationships**

8. works understandingly and cooperatively with parents
9. supports and participates in parent-teacher groups
10. participates in community activities
11. interprets the school's program and policies to the community as occasion permits

## **C. Appearance and manner**

12. dresses appropriately, is well-groomed and poised
13. speaks clearly, using good English in a well-modulated voice
14. shows genuine respect, concern and warmth for others, both child and adult
15. attempts to correct personal

habits and mannerisms that detract from effective teaching

16. is physically able to perform his duties; is not handicapped by too frequent absence or illness
17. maintains sound emotional adjustment; is calm and mature in his reactions

# **II. Teaching performance**

## **D. Teaching techniques**

18. helps each child set appropriate goals for himself
19. varies method and content to suit individual differences and goals
20. directs interesting, varied, and stimulating classes
21. practices principles of democratic leadership with children and adults
22. plans each day carefully, but is flexible in utilizing immediate educational opportunities
23. helps children develop and strengthen their moral and spiritual qualities

## **E. Classroom environment**

24. maintains an attractive and healthful classroom
25. has work areas arranged for maximum pupil stimulation and accomplishment
26. recognizes each child's emotional and social needs
27. has concern for all of his children regardless of their cultural, intellectual, or academic status
28. is respected by pupils; secures voluntary cooperation; has a minimum of behavior problems
29. handles behavior problems individually when possible

## **F. Pupil growth**

30. helps children achieve satisfactorily in skill subjects
31. helps children evaluate themselves and their growth as a means to further growth



32. encourages growth in democratic participation and sharing of responsibilities.
33. helps students integrate their learning experience into meaningful pattern.
34. encourages pupils to make their own judgment according to their various levels of maturity
35. helps children acquire good study and work habits
36. helps children develop the ability to work profitably in classroom situations

### III. Professional qualities

37. displays the refinement character, and objectivity expected of the professional person
38. is proud of his profession and attempts to promote respect for it.
39. accept personal responsibility for compliance with rules and for attention to administrative requests
40. does not abuse privileges
41. is continuously growing professionally through study, experimentation, and participation in professional activities
42. is critical of, and consistently trying to improve, his own work
43. initiates or participates fully in activities designed to meet the needs of his particular school
44. possesses adequate subject matter background

Alexander(T) summarizes the

characteristics of good teachers as follows:

### I. Personal equipment

Concern for the individual  
Emotional stability  
Enthusiasm  
Intelligence  
Integrity  
Knowledge  
Personal charm  
Skill in communication

### II. Ways of teaching

Effective relations with individual pupils  
Adequate planning and preparation  
Wise use of teaching aids  
Involvement of pupils in varied learning experiences.  
Active leadership of the learning group

### III. Professional behavior

Helping other teachers  
Cooperating in general school responsibilities  
Cooperating in educational improvement  
Strengthening professional organizations.  
Maintaining ethical relations with the school administration and the public

## CONCLUSION

There was no general agreement as to what were the specific characteristics of good teachers. Research for the past fifty years did not produce significant results about the nature and measurement of teacher

personality, or about the relation between teacher personality and teaching effectiveness. This has been caused by a number of serious obstacles such as the problem of definition, the problem of instrumenta-



tion, and the problem of criterion. There are also a number of specific experimental limitations such as the limitation of treating teachers as a single group; the problem of varied teaching situations.

However, careful selection and better pre-service preparation for college students will offer to the high schools, young men and women better able to meet the demands for successful teaching.

The trainees most likely to develop into excellent teachers will be identified by the following characteristics which are mentioned frequently by the literature:

#### Personal Qualifications

1. positive attitude toward teaching
2. Ability to adapt self to environment.
3. Ability to become socially well-adjusted.
4. Healthy-physically and mentally.
5. Ability to make better grade than average in college work
6. Maturity and democratic leadership ability
7. Dependable
8. Independent
9. Resourceful and sincere.
10. Capable of using good judgment
11. Patient
12. Verbally intelligent
13. Creative
14. Initiative
15. Imaginative
16. Enthusiastic
17. Wisely tolerant
18. Friendly.
19. Has a sense of humor.
20. Sympathetic.

#### Professional Qualifications

- I. A thorough understanding of professional knowledge:
  - a. Basic understanding of the

growth and development of the child. Understand the adolescents and be sensitive to their needs.

- b. Skill and knowledge pertaining to psychological principles of teaching.
  - c. Good understanding of teaching learning process.
  - d. Identification, diagnosis of learning problems.
  - e. Knowledge of the objectives of education in general and secondary education in particular.
  - f. Competence in subject matter to be taught.
  - g. Effective organization of subject matter.
  - h. Effective use of audio-visual aids.
  - i. A broad and rich cultural background and familiarity with a wide variety of learning activities and resources.
  - j. Competence in the liberal arts.
  - k. Acquaintance with the curriculum.
  - l. Skills in measuring results (Evaluation).
2. Willingness to acquire certain teaching skills.
    - a. Provision for individual differences.
    - b. Effectiveness in promoting good working conditions with pupils.
    - c. Ability to organize and plan work.
    - d. Teacher-pupil planning.
    - e. Ability to promote and hold pupil's interest.
    - f. Teaching skills functionally.
    - g. Provision for individual and group guidance.
    - h. Effective discipline.
    - i. Managerial ability (in classroom and shop).
    - j. Insistence on high standards.
    - k. Willingness to experiment.
    - l. Successful experience in student teaching.



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