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Determination of Yield and Yield Components and Relationship among the Components of Grain Sorghum Cultivars Grown as Main Crop

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Abstract: This research was conducted in the 1998 and 1999 main crop season in the Southeastern Anatolia Region of Turkey. The experimental design was a Completely Randomized Block with three replications. In the research, were used 24 grain Sorghum cultivars to determine high yielding cultivars. The grain yields of the grain sorghum cultivars varied between 3589.9-9634.8 kg ha\(^{-1}\) in the research. In all the observed characters, statistically significant differences were determined among cultivars. The positive and significant relationships were determined between the grain yields and grain yields per panicle, panicle lengths, plant heights (p<0.01). However, the negative and significant relationships were determined between the crude protein percentages and grain yields, panicle lengths, 1000 seed weights (p<0.01). As a result, DK 64 and KS 989 were determined as high yielding cultivars under Southeastern Anatolia Region conditions as main crops season.

Key words: Grain sorghum, cultivars, correlation, main crop, yield

INTRODUCTION

The grain sorghum takes places fifth between cereals with 42 million ha\(^{-1}\) sowing area and 58.5 million tones grain yield production in the world\(^{[9]}\). It is grown to some extent or occasionally grown in all countries of the world except in the cool northwestern part of Europe. In Turkey, grain sorghum takes places seventh between cereals with 3500 ha sowing area and 6700 tones grain yield production\(^{[9]}\).

The region has an important potential for livestock with about 4 million sheep, 1.5 million goats and 700,000 cattle\(^{[9]}\). To meet the increasing needs for feed in the region, the sorghum must be produced.

Most of the sorghum grain grown in Asia and the African tropics is used for human food. Elsewhere it is generally fed to livestock or poultry. Considerable grain sorghum replaces corn grits in the brewing and distilling industries and in the manufacture of alcohol. During World War II, the grain of waxy varieties was used for extraction of starch to manufacture a satisfactory substitute for minute tapioca. The important use is in the manufacture of starch, glucose, sirup, oil, gluten feeds and other products similar to those produced in the wet-milling of corn. Grain sorghum flour is used for adhesives. The entire plants of sorghum sometimes are chopped, dehydrated, ground and pelleted for feed\(^{[9]}\). Sorghum is an important component in traditional farming systems in the semi-arid tropics of Africa and Asia, with mean grain yields of 863 and 1157 kg ha\(^{-1}\), respectively\(^{[9]}\). Low soil fertility, poor stand establishment and highly variable drought stress are major production constraints in these areas. The local farmers usually do not have access to irrigation facilities or fertilizer stocks and rely totally on the stress resistance and yield stability of their rainfed crop cultivars.

It’s very important to determine most suitable variety and sowing techniques in any region for increase quality and yields.

In previous studies; the yield and adaptation of different cultivars of grain sorghum were investigated and the results varied widely. Grain yield varied between 3028.3 and 9825 kg ha\(^{-1}\), plants height were 78.88 to 151.86 cm high, with protein contents of 7.0 to 25.0\%, 1000 seed weight varied between 21.30 and 27.33 g, grain yields per panicle varied between 26.63 and 74.50, panicle length between 23.64 and 28.07 g\(^{[10]}\). However, in experiments in other countries, grain yields of 470 to 12816 kg ha\(^{-1}\), 1000 seed weight yields of 24.3 to 34.4 g, grain yields per panicle of 27.0 to 84.4 g. have been obtained, with plants 79.25 to 305.50 cm high and crude protein contents of 8.26 to 13.36\%\(^{[11-21]}\).

By this research, 24 grain sorghum varieties investigated as main crop to determination of most suitable varieties in the Southeastern Anatolia Region of Turkey.

MATERIALS AND METHODS

This research was been carried out at Dicle University in Diyarbakir (37°54' N, 40°14' E altitude 660 m).
Generally, Mediterranean and East Anatolian continental climates are dominant in this region. The average annual temperature is 15.8°C, rainfall is 481.6 mm and the average relative humidity is about 53.8%. The average temperature can reach 30°C in July and August. The lowest average temperature can be 7°C in December and January. The earliest frost in the region is usually at the end of October and the last frost around end of April.

Most rain falls in winter and there is almost no rainfall from July to September. The highest humidity (70%) occurs in winter, lowest (27%) in summer.

The soils of the experimental area were thinly structured alluvial material or limestone. The soil is low in organic material and phosphorus, has adequate calcium and high clay content (49 to 67%) in the 0-150 cm profile.[41]

Twenty four cultivars of grain sorghum were used in the research. These cultivars and their source institutions/companies and origins are shown in Table 1.

The experimental design was a Completely Randomized Block with four replications.

Seed was sown by hand at 125,000 ha\(^{-1}\) in four-row plots with rows 70 cm apart and 5 m long. Sowing took place on 06 April 1998 (first year) and 10 April 1999 (second year). The experimental area was fertilized with 150 kg ha\(^{-1}\) nitrogen (N) and 100 kg ha\(^{-1}\) phosphorus (P) before planting.

For protein analysis, the seed samples were ground. Sample taken from this mixture was used for protein analysis. The crude protein percentage was determined with Leco FP-528 protein analyzer.

Analysis of variance was done by using a MSTAT-C statistic program and differences were compared by Duncan’s.

RESULTS AND DISCUSSION

Grain yield: The differences between the cultivars with respect to the grain yield were found significant for each year and average of the these years. The average grain yield was 6341.1 kg ha\(^{-1}\) in 1998, 6305.2 kg ha\(^{-1}\) in 1999 and the two years average value was 6323.2 kg ha\(^{-1}\) (Table 2).

The highest grain yields were from DK 64 in 1998, they were followed by NK Dorado, DK 65 and NK Rubino. In 1999, DK 64 produced the highest yield and this was followed by KS 397, NK Dorado, DK 65 (Table 2).

Averaged over the two years, DK 64 (9634.8 kg ha\(^{-1}\)) was gave the highest grain yield, followed consecutively by NK Dorado, KS 397 and DK 65. The lowest yields were obtained from TR Öğret 77, TR Aldan and TR Beydan (Table 2).

Grain yield per panicle: The differences between the cultivars with respect to the grain yield per panicle were found significant for each year and average of the these years. The average grain yields per panicle were 55.22 g in 1998, 59.60 g in 1999 and the two years average value was 57.41 g (Table 3).

The highest grain yield per panicle values were from DK 64 in 1998, they were followed by TR Aldan, DK 65 and DK 58. In 1999, DK 64 produced the highest
Table 2: The average grain yields (kg ha\(^{-1}\)) of different cultivars of sorghum and statistical groups*

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>1998</th>
<th>1999</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK 37</td>
<td>6434.6c-g</td>
<td>6180.4d-g</td>
<td>6307.5h-</td>
</tr>
<tr>
<td>DK 39 Y</td>
<td>5718.7d-h</td>
<td>6167.1e-g</td>
<td>5942.9f-</td>
</tr>
<tr>
<td>DK 41 Y</td>
<td>5370.5e-h</td>
<td>5488.7g</td>
<td>5379.6j-</td>
</tr>
<tr>
<td>DK 48</td>
<td>5838.1d-h</td>
<td>5907.1f-g</td>
<td>5872.6g-</td>
</tr>
<tr>
<td>DK 54</td>
<td>6655.4b-f</td>
<td>6968.7b-e</td>
<td>6812.1c-f</td>
</tr>
<tr>
<td>DK 58</td>
<td>5188.9c-1</td>
<td>5847.2f-g</td>
<td>5518.5h-</td>
</tr>
<tr>
<td>DK 64</td>
<td>10134.7a</td>
<td>9511.5a</td>
<td>9634.8a</td>
</tr>
<tr>
<td>KS 397</td>
<td>7560.5a</td>
<td>7398.8b</td>
<td>7434.7bc</td>
</tr>
<tr>
<td>KS 989</td>
<td>6872.6b-e</td>
<td>7017.3b-e</td>
<td>6945.8b-e</td>
</tr>
<tr>
<td>NK Dorado</td>
<td>8160.6b</td>
<td>7460.0bc</td>
<td>7810.3b</td>
</tr>
<tr>
<td>NK Randua</td>
<td>6730.2b-f</td>
<td>6566.8c-f</td>
<td>6648.5d-g</td>
</tr>
<tr>
<td>NK Rubino</td>
<td>7835.9b-c</td>
<td>7020.6b-e</td>
<td>7432.6bcd</td>
</tr>
<tr>
<td>NK XP 3082</td>
<td>5097.1c-d</td>
<td>5413.0c-g</td>
<td>5255.1ij</td>
</tr>
<tr>
<td>NK XP 3322</td>
<td>6909.8c-e</td>
<td>6867.7c-f</td>
<td>6989.8c-f</td>
</tr>
<tr>
<td>P 8312 Y</td>
<td>5320.2c-d</td>
<td>5954.2b-g</td>
<td>5741.7a-h</td>
</tr>
<tr>
<td>P 8305</td>
<td>7010.8b-c</td>
<td>7128.2b-e</td>
<td>7069.5b-e</td>
</tr>
<tr>
<td>P 8418</td>
<td>7524.5a</td>
<td>6932.1c-e</td>
<td>7228.3b-a</td>
</tr>
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<td>P 8500</td>
<td>6993.3b-c</td>
<td>7151.4b-d</td>
<td>7072.4b-e</td>
</tr>
<tr>
<td>P 8771</td>
<td>6302.7c-g</td>
<td>6503.8c-f</td>
<td>6434.2e-h</td>
</tr>
<tr>
<td>TR Aldan</td>
<td>4897.3a-d</td>
<td>4553.8a</td>
<td>4725.5j-k</td>
</tr>
<tr>
<td>TR Aldan</td>
<td>3620.0j</td>
<td>3992.7</td>
<td>3806.4i</td>
</tr>
<tr>
<td>TR Beydan</td>
<td>4408.1a-jg</td>
<td>4272.0h</td>
<td>4370.1kl</td>
</tr>
<tr>
<td>TR OGRT 77</td>
<td>3372.7a</td>
<td>3807.2h</td>
<td>3589.9i</td>
</tr>
<tr>
<td>Average</td>
<td>6341.1</td>
<td>6303.2</td>
<td>6323.2</td>
</tr>
<tr>
<td>LSD (5%)</td>
<td>1426.0</td>
<td>827.0</td>
<td>813.6</td>
</tr>
<tr>
<td>CV (%)</td>
<td>13.69</td>
<td>7.99</td>
<td>11.22</td>
</tr>
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</table>

*Means shown with the same letter (s) in the same column are not significantly different at 0.05 probability level

Table 3: The average grain yields per panicle (g) of different cultivars of sorghum and statistical groups*

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>1998</th>
<th>1999</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK 37</td>
<td>53.75b-h</td>
<td>55.68b-h</td>
<td>54.72b-l</td>
</tr>
<tr>
<td>DK 39 Y</td>
<td>61.4c-o</td>
<td>66.5c-o</td>
<td>63.98c-e</td>
</tr>
<tr>
<td>DK 41 Y</td>
<td>50.33e-a</td>
<td>52.83g</td>
<td>51.58j-f</td>
</tr>
<tr>
<td>DK 48</td>
<td>61.12f-f</td>
<td>67.37b</td>
<td>64.25e-f</td>
</tr>
<tr>
<td>DK 54</td>
<td>56.95g-e</td>
<td>63.78b-cd</td>
<td>60.36h-d</td>
</tr>
<tr>
<td>DK 58</td>
<td>63.72cd-e</td>
<td>67.51b</td>
<td>65.61b-d</td>
</tr>
<tr>
<td>DK 64</td>
<td>85.10a</td>
<td>100.15a</td>
<td>92.63a</td>
</tr>
<tr>
<td>DK 65</td>
<td>66.53b-c</td>
<td>67.09c-b</td>
<td>66.75c-b</td>
</tr>
<tr>
<td>KS 397</td>
<td>53.27b-h</td>
<td>60.0c-f</td>
<td>56.94c-j</td>
</tr>
<tr>
<td>KS 989</td>
<td>56.73c-g</td>
<td>60.53f</td>
<td>58.83e-i</td>
</tr>
<tr>
<td>NK Dorado</td>
<td>50.00f-d</td>
<td>53.73gh</td>
<td>51.82jkl</td>
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<tr>
<td>NK Randua</td>
<td>49.67h</td>
<td>51.54h</td>
<td>50.60k</td>
</tr>
<tr>
<td>NK Rubino</td>
<td>51.67f</td>
<td>57.19e-h</td>
<td>54.34h-l</td>
</tr>
<tr>
<td>NK XP 3082</td>
<td>34.00</td>
<td>39.43k</td>
<td>36.71m</td>
</tr>
<tr>
<td>NK XP 3322</td>
<td>49.40h</td>
<td>51.36m</td>
<td>50.38k</td>
</tr>
<tr>
<td>P 8212 Y</td>
<td>50.40c-a</td>
<td>56.53e-h</td>
<td>53.47d-l</td>
</tr>
<tr>
<td>P 8305</td>
<td>59.45g</td>
<td>64.11bc-f</td>
<td>61.78g-c</td>
</tr>
<tr>
<td>P 8418</td>
<td>60.26d-e</td>
<td>65.37c-b</td>
<td>62.82f-f</td>
</tr>
<tr>
<td>P 8500</td>
<td>55.01h</td>
<td>62.18b-e</td>
<td>58.59e-i</td>
</tr>
<tr>
<td>P 8771</td>
<td>54.34h</td>
<td>58.43d-g</td>
<td>56.38g-k</td>
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<tr>
<td>TR Aldan</td>
<td>69.88</td>
<td>66.79c</td>
<td>68.31b</td>
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<tr>
<td>TR Aldan</td>
<td>41.98j</td>
<td>48.61j</td>
<td>44.40m</td>
</tr>
<tr>
<td>TR Beydan</td>
<td>44.87m</td>
<td>42.60j-k</td>
<td>43.76m</td>
</tr>
<tr>
<td>TR OGRT 77</td>
<td>45.46h</td>
<td>51.88f</td>
<td>48.67m</td>
</tr>
<tr>
<td>Average</td>
<td>55.22</td>
<td>59.60</td>
<td>57.41</td>
</tr>
<tr>
<td>LSD (5%)</td>
<td>9.33</td>
<td>5.49</td>
<td>5.34</td>
</tr>
<tr>
<td>CV (%)</td>
<td>10.28</td>
<td>5.61</td>
<td>8.12</td>
</tr>
</tbody>
</table>

*Means shown with the same letter (s) in the same column are not significantly different at 0.05 probability level

Averaged over the two years, DK 64 (92.63 g) was the highest grain yield per panicle, followed consecutively by TR Aldan, DK 65 and DK 58. The lowest yields were obtained from NK XP 3082, TR Beydan and TR Aldan (Table 3).

Panicle length: The differences between the cultivars with respect to the panicle length were found significant for each year and average of these years. The average panicle lengths were 25.91 cm in 1998, 27.24 cm in 1999 and the two years average value was 26.58 cm (Table 4).

The highest panicle length values were from P 8305 in 1998, they were followed by DK 65, P 8212 Y and DK 37. In 1999, P 8305 was given the highest panicle length too and this was followed by KS 989, DK 65 and KS 397 (Table 4).

Averaged over the two years, P 8305 (29.94 cm) was the highest panicle length value, followed consecutively by KS 989, DK 65 and DK 37. The lowest values were obtained from TR Aldan, TR Beydan and NK XP 3322 (Table 4).

Plant height: The differences between the cultivars with respect to the plant height were found significant for each year and average of these years. The average plant height was 99.63 cm in 1998, 103.78 cm in 1999 and the two years average value was 101.75 cm (Table 5).
Table 5: The average plant height (cm) of different cultivars of sorghum and statistical groups*

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>1998</th>
<th>1999</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK 37</td>
<td>97.67±j</td>
<td>99.76±j</td>
<td>98.71±j</td>
</tr>
<tr>
<td>DK 39 Y</td>
<td>94.93±j</td>
<td>97.75±j</td>
<td>96.34±j</td>
</tr>
<tr>
<td>DK 41 Y</td>
<td>105.60±c-f</td>
<td>108.42±g</td>
<td>107.01±e-f</td>
</tr>
<tr>
<td>DK 48</td>
<td>98.67±a-e</td>
<td>103.68±g-i</td>
<td>101.07±a-g</td>
</tr>
<tr>
<td>DK 54</td>
<td>108.27±b-e</td>
<td>114.53±b-d</td>
<td>111.40±c-d</td>
</tr>
<tr>
<td>DK 58</td>
<td>105.00±c-e</td>
<td>104.80±a</td>
<td>105.00±g</td>
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<tr>
<td>DK 64</td>
<td>105.07±c-f</td>
<td>112.95±c-e</td>
<td>109.01±c-e</td>
</tr>
<tr>
<td>DK 65</td>
<td>115.73±b</td>
<td>119.84±b</td>
<td>117.78±b</td>
</tr>
<tr>
<td>KS 397</td>
<td>90.00±k</td>
<td>92.69±l</td>
<td>91.35±k</td>
</tr>
<tr>
<td>KS 989</td>
<td>111.07±bc</td>
<td>115.27±bc</td>
<td>113.47±bc</td>
</tr>
<tr>
<td>NK Dowaro</td>
<td>96.13±j</td>
<td>97.97±l</td>
<td>97.05±k</td>
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<td>NK Ramada</td>
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<td>NK Rubino</td>
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<td>NK XP 3322</td>
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<td>90.60l</td>
<td>88.56±mm</td>
</tr>
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<td>P 8212 Y</td>
<td>101.24±b-h</td>
<td>104.03±a-g</td>
<td>102.61±fgh</td>
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<tr>
<td>P 8418</td>
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<td>106.83±h</td>
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<td>P 8771</td>
<td>95.00±j</td>
<td>97.62±l</td>
<td>96.31±l</td>
</tr>
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<td>95.73±j</td>
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<td>TR Beyden</td>
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<td>95.12±l</td>
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<td>TR OGRT 77</td>
<td>84.33±k</td>
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<td>88.18±n</td>
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<tr>
<td>Average</td>
<td>99.63</td>
<td>103.78</td>
<td>101.78</td>
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<tr>
<td>LSD (5%)</td>
<td>8.57±k</td>
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<td>5.24±k</td>
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<tr>
<td>CV (%)</td>
<td>5.24</td>
<td>3.68</td>
<td>4.50</td>
</tr>
</tbody>
</table>

*Means shown with the same letter (a, b, c) in the same column are not significantly different at 0.05 probability level.

Table 6: The average Test weight (kg) of different cultivars of sorghum and statistical groups*

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>1998</th>
<th>1999</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK 37</td>
<td>71.86c</td>
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<td>70.55±g</td>
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<td>DK 39 Y</td>
<td>67.0c</td>
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<td>67.94±d</td>
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<td>69.0±j</td>
<td>67.45±j</td>
<td>68.24±d</td>
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<td>DK 48</td>
<td>71.57bc</td>
<td>72.67±b-h</td>
<td>72.12±b-f</td>
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<td>DK 54</td>
<td>70.52bc</td>
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<td>68.92±g</td>
</tr>
<tr>
<td>DK 58</td>
<td>68.73</td>
<td>69.93±j</td>
<td>69.23±b-g</td>
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<td>DK 64</td>
<td>76.8±ab</td>
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<td>77.1±a</td>
</tr>
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<tr>
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<td>71.77±e</td>
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<tr>
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<td>72.45±c</td>
<td>73.20±d</td>
<td>72.83±c</td>
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<td>NK Dowaro</td>
<td>66.53c</td>
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<td>67.29±g</td>
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<td>NK Ramada</td>
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<td>73.96±e</td>
<td>72.7±d-f</td>
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<td>NK Rubino</td>
<td>67.87c</td>
<td>67.68±j</td>
<td>67.48±g</td>
</tr>
<tr>
<td>NK XP 3082</td>
<td>67.06c</td>
<td>68.17±j</td>
<td>67.62±g</td>
</tr>
<tr>
<td>NK XP 3322</td>
<td>65.82c</td>
<td>67.34j</td>
<td>66.58g</td>
</tr>
<tr>
<td>P 8212 Y</td>
<td>71.88±c</td>
<td>70.91±c-j</td>
<td>71.40±f-f</td>
</tr>
<tr>
<td>P 8805</td>
<td>69.02c</td>
<td>71.06±j</td>
<td>70.48±h-g</td>
</tr>
<tr>
<td>P 8418</td>
<td>70.92bc</td>
<td>69.7±j</td>
<td>70.34±g</td>
</tr>
<tr>
<td>P 8500</td>
<td>71.96bc</td>
<td>74.65±d</td>
<td>73.31±bc</td>
</tr>
<tr>
<td>P 8771</td>
<td>71.73bc</td>
<td>75.53±c-e</td>
<td>73.55b</td>
</tr>
<tr>
<td>TR Alphan</td>
<td>78.61a</td>
<td>77.95±a</td>
<td>78.28±a</td>
</tr>
<tr>
<td>TR Alphan</td>
<td>72.25±a-c</td>
<td>68.68±j</td>
<td>70.47±g</td>
</tr>
<tr>
<td>TR Beyden</td>
<td>71.67bc</td>
<td>74.02±a-b</td>
<td>72.84±bc</td>
</tr>
<tr>
<td>TR OGRT 77</td>
<td>71.92±c</td>
<td>73.59±d</td>
<td>72.75±bc</td>
</tr>
<tr>
<td>Average</td>
<td>70.73</td>
<td>71.22</td>
<td>70.97</td>
</tr>
<tr>
<td>LSD (5%)</td>
<td>9.539</td>
<td>4.283</td>
<td>3.612</td>
</tr>
<tr>
<td>CV (%)</td>
<td>5.11</td>
<td>3.66</td>
<td>4.44</td>
</tr>
</tbody>
</table>

*Means shown with the same letter (a, b, c) in the same column are not significantly different at 0.05 probability level.

The highest plant height value was from P 8418 in 1998, they were followed by DK 65, KS 989 and NK Rubino. In 1999, P 8418 was given the highest plant height too and this was followed by DK 65, KS 989 and DK 64 (Table 5).

Averaged over the two years, P 8418 (123.73 cm) was given the highest plant height, followed consecutively by DK 65, KS 989 and DK 54. The lowest values were obtained from TR OGRT 77, NK XP 3322 and NK Ramada (Table 5).
Test weight: The differences between the cultivars with respect to the test weight were found significant for each year and average of these years. The average test weight was 70.73 kg in 1998, 71.22 kg in 1999 and the two years average value was 70.97 kg (Table 6).

The highest test weight value was from TR Akdan in 1998, they were followed by DK 64, KS 989 and P 8500. In 1999, TR Akdan was given the highest test weight value too and this was followed by DK 64, P 8771 and P 8500 (Table 6).

Averaged over the two years, TR Akdan (78.28 kg) was gave the highest test weight, followed consecutively by DK 64, P 8771 and P 8500. The lowest values were obtained from NK XP 3322, NK Donado and NK Rubino (Table 6).

Thousand seed weight: The differences between the cultivars with respect to 1000 seed weight were found significant for each year and average of the these years. The average 1000 seed weight was 25.49 g in 1998, 26.05 g in 1999 and the two years average value was 25.79 g (Table 7).

The highest 1000 seed weight value was from DK 58 in 1998, they were followed by DK 54, DK 37 and TR Akdan. In 1999, DK 58 was given the highest 1000 seed weight value too and this was followed by DK 37, TR Akdan and DK 64 (Table 7).

Averaged over the two years, DK 58 (30.21 g) was gave the highest 1000 seed weight value, followed consecutively by DK 37, DK 54 and TR Akdan. The lowest values were obtained from TR Beydant, KS 989 and TR Akdan (Table 7).

Crude protein percentage: The differences between the cultivars with respect to crude protein percentage were found significant for each year and average of the these years. The average crude protein percentage was 10.82% in 1998, 10.87% in 1999 and the two years average value was 10.83% (Table 8).

The highest crude protein percentage value was from TR Beydant in 1998, they were followed by TR Akdan, KS 989 and P 8500. In 1999, TR Beydant was given the highest crude protein percentage value too and this was followed by TR Akdan, KS 989 and TR Akdan (Table 8).

Averaged over the two years, TR Beydant (12.77%) was gave the highest crude protein percentage value, followed consecutively by TR Akdan, KS 989 and P 8418. The lowest values were obtained from DK 64, NK XP 3322 and DK 37 (Table 8).

Correlations: The positively and significant relationships were determined between the grain yields and grain yields per panicle, panicle lengths, plant heights, test weight, 1000 seed weight and crude protein percentage. The grain yield per panicle was positively correlated with grain yield, panicle length, plant height, test weight, 1000 seed weight (p<0.01), negative correlated with crude protein percentage. The plant height was positively correlated with grain yields, grain yields per panicle and panicle length (p<0.01). The test weight was positively correlated with grain yield per panicle (p<0.01).

1000 seed weight was positively correlated with grain yields (p<0.05), grain yields per panicle and panicle length (p<0.01). However (p>0.01), the negatively and significant relationships were determined between the crude protein percentages and grain yields, grain yields per panicle, panicle lengths, 1000 seed weights (p<0.01).

The performance of twenty four sorghum cultivars at main crop season with respect to yield and yield component was determinate in this study.

According to averaged over the two years, DK 64 (9634.8 kg ha⁻¹), NK Donado (7810.3 kg ha⁻¹) and (KS 397 7734.7 kg ha⁻¹) had highest grain yields, while TR Öğret 77 (3589.9 kg ha⁻¹) was the lowest. These findings are showing similarity with some other researches[3][4][5].

The highest average crude protein percentage were from TR Beydant (12.77%), TR Adlan (12.13%) and KS 989 (11.68%). These findings are consistent with some other researches[5][6].

According to these findings, DK 64 and KS 989 cultivars should be recommended because their high grain yields and crude protein yield.

REFERENCES