Rheological Properties and Baking Quality of Flour from a Landrace and Durum Wheat Cultivars Grown in Jordan

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ABSTRACT

Rheological and bread-making quality of a landrace (Horani-27) and nine durum wheat cultivars (ACSAD-65, Amra, Der Alla-6, Der Alla-2, Veery, Korifla, Lacesh, Rabi-S, and Sham-1) grown in Jordan were assessed by farinograph and extensigraph. Farinograph and extensigraph data showed significant differences between these cultivars. When the characteristics of bread loaves were compared, all the durum wheat cultivars produced desirable characteristics for breadmaking. Amra, Veery, and Lacesh were rated excellent. All others, including the landrace, were rated good.

Bread is the daily staple of the Jordanian people and provides most of their calories and proteins. Production has not been sufficient to satisfy the domestic needs. In 1989, 54,519.8 metric tons were produced on 562,116.8 hectares (Anonymous 1989).

Wheat yield improvement, through breeding programs and the introduction of high-yielding cultivars, has been a major effort of the Ministry of Agriculture in Jordan. The goals are to meet the increasing demand for bread and reverse declining production.

The rheological properties and baking quality of flour obtained from durum wheat cultivars have been investigated by many workers (Finney and Barmore 1948; Faridi et al 1982; Faridi and Rubenthaler 1983, 1984; Guy 1984; Pomeranz et al 1984; Khatchadourian et al 1985; Amr 1988; Huifen and Ponte 1988; Lai et al 1989; May et al 1989; Silaula et al 1989).

The objective of this study was to compare the rheological and baking quality of a landrace and nine durum wheat varieties grown in Jordan.

MATERIALS AND METHODS

Materials

Nine durum wheat cultivars used in this study were: ACSAD-65 (Syria 1988), Amra (Jordan 1988), Der Alla-6 (Jordan 1988), Der Alla-2 (Jordan 1988), Veery (Mexico, not released), Horani-27 (landrace), Korifla (Mexico 1988), Lacesh (Mexico 1988),
Farinograph data showed high water-absorption values ranging from 59% (ACSAD-65, Amra, Veery and Sham-1) to 68.5% (Horani-27). All other wheat varieties were intermediate. The arrival time ranged from 1.5 min (Lacesh) to 4.5 min (Veery and Korilha). Peak time, as shown in Table I, ranged from 2 min (Amra and Lacesh) to 3.5 min (Sham-1). All other cultivars were intermediate. These results compare very well with rheological data presented on two major wheat varieties grown in Saudi Arabia (Khatachadorian et al 1985) and with rheological data presented on hard red winter wheat flour (Volpe and Zabik 1981). The peak time in this study compares well with data presented by Volpe and Zabik (1981), who reported a peak time range of 2-15 min for hard red winter wheat flour supplemented with single-cell yeast protein.

The mechanical tolerance index data is also shown in Table I. It ranged from 10 Brabender units (BU) (ACSAD-65, Veery, and Horani-27) to 22 BU (Korilha). All other cultivars were intermediate. These results are in agreement with data reported on Saudi Arabian wheat cultivars presented by Khatachadorian et al (1985).

Extsigraph Studies

As indicated in Table I, the resistance to extension of dough made from the investigated wheat cultivars ranged from 400 BU (ACSAD-65, Lacesh and Sham-1) to 500 BU (Der Alla-2). All others were intermediates. These data compare very well with those reported by Khatachadorian et al (1985), Volpe and Zabik (1981), and Singh et al (1990). The extsigraphic data indicated a medium (400-500 BU) resistance to extension and a slightly low extensibility, which ranged from 132 mm (Der Alla-2 and Horani-27) to 156 mm (Rabi-S). The values of extensibility are lower than those reported by Khatachadorian et al (1985) and El-Sayed et al (1978 a,b) for flour obtained from Saudi wheat and hard wheat, respectively, but they are in agreement with values reported by Yaseen et al (1991).

The ratio between extensibility and resistance to extension, as shown in Table I, are in conformity with values reported by Yaseen et al (1991) that are characteristic of medium strength flours.

Bread Study

The characteristics of bread loaves made from the wheat flours we investigated are shown in Table II. The weight of the loaves ranged from 150.1 g (Lacesh) to 162.8 g (Sham-1). Loaf volume ranged from 315 cm³ (Sham-1) to 750 cm³ (Veery). The specific volume ranged from 1.9 cm³/g (Sham-1) to 5.0 cm³/g (Veery).

**RESULTS AND DISCUSSION**

Farinograph Studies

Results of the rheological properties of the wheat flour samples obtained from the farinograph data are shown in Table I. The farinograph absorption (%) of the wheat cultivars ranged from 59% (ACSAD-65) to 68.5% (Horani-27). All other wheat varieties were intermediate. The arrival time ranged from 1.5 min (Lacesh) to 4.5 min (Veery and Korilha). Peak time, as shown in Table I, ranged from 2 min (Amra and Lacesh) to 3.5 min (Sham-1). All other cultivars were intermediate. These results compare very well with rheological data presented on two major wheat varieties grown in Saudi Arabia (Khatachadorian et al 1985) and with rheological data presented on hard red spring wheat flour (Volpe and Zabik 1981). The peak time in this study compares well with data presented by Volpe and Zabik (1981), who reported a peak time range of 2-15 min for hard red winter wheat flour supplemented with single-cell yeast protein.

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All others had intermediate values. The loaf weight, loaf volume, and specific volume values presented in Table II are in agreement with those values presented by Faridi and Rubenthaler (1983) on 12 wheat varieties used to produce four North African breads. Our data is in agreement with values presented by Singh et al. (1990) on 15 wheat cultivars.

Data on crust color, crispness, and loaf integrity are presented in Table II. Our wheat cultivars produced acceptable bread. Amra, Veery, and Lacesh were rated excellent. All others were rated good. Some slight differences were noted in crumb texture and crust color among the investigated varieties.

**CONCLUSIONS**

There are more than 20 improved and newly introduced wheat cultivars in Jordan. Durum wheat has been the most important grain crop in Jordan in terms of acreage and total gross value. These varieties were compared under varying environmental conditions for yield performance (Jaradat 1988).

The data showed Lacesh, Veery, and Amra cultivars were superior to other varieties in terms of bread volume, while ACSAD-65 and the landrace (Horani-27) were inferior.

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**LITERATURE CITED**


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