

Effect of cultivar and year on yield and grain quality of two-row winter barley

Milomirka MADIĆ¹, Aleksandar PAUNOVIĆ¹, Vladeta STEVOVIĆ¹, Desimir KNEŽEVIĆ², Miodrag JELIĆ², Dragan ĐUROVIĆ¹

¹Faculty of Agronomy, Cara Dušana 34, 32000 Čačak, Serbia, (e-mail: mmadic@tfc.kg.ac.rs)

²Faculty of Agriculture, Jelene Anžijske bb, 38228 Zubin Potok

Abstract

Grain yield and quality components were evaluated in six two-row winter barley cultivars. Comparative studies were conducted during 2005-2008 on the experimental field of the Small Grains Research Centre, Kragujevac. Data were subjected to a two-factor analysis of variance. Means were separated using Fisher's LSD test. The cultivars showed significant differences in grain yield, 1000-kernel weight and germination energy, and no substantial differences in protein and extract contents. Grain yield was highest in cv. Record and lowest in cv. NS-331. Grain yield, 1000-kernel weight and germination energy were substantially affected by growing conditions (year) and the genotype-year interaction.

Key words: malting barley cultivar, grain yield, quality traits

Introduction

Grain yield and quality of barley are major traits of barley genotypes expressed through the synthesis of a series of individual traits and environmental conditions under which plants develop. Selection for improved barley production should be focused on creating genotypes that will have a high yield potential i.e. exhibit all desirable agronomic and technological traits under different agroenvironmental conditions.

Grain yield has changed during the last century, with yield increases mostly resulting from the development of plant selection and breeding techniques that lead to the genetic yield potential of newly created winter barley cultivars of above 11 t/ha (Pržulj et al., 2009).

Yield increase is associated with improvement of the genetic basis of cultivars and use of adequate production technology. An annual yield increase in two-row barley is 1.1%, being largely due to an increase in certain yield components such as kernel weight and kernel number per spike, increase in total biomass or improved harvest index (Pržulj et al. 2000.; Madić et. al. 2006.; Paunović et. al. 2007.)

Apart from high yield, 1000-kernel weight and good biotic and abiotic stress resistance, malting barley cultivars should have a low content of chaff and proteins and a high starch content. Thousand-kernel weight and hectolitre weight are among initial major indicators of grain quality; hence the positive correlation between malt extract yield and grain size (Paunović et al. 2006).

Protein content is the initial indicator of qualitative analysis of barley grain. Malting barley should have a low content of proteins (below 11.5%), soluble ones in particular, since a high content of soluble proteins gives a saturated taste to the beer produced and makes the colour and taste of beer difficult to control.

Apart from the genetic factors (choice of cultivar), an increase in protein content was substantially affected by environmental factors such as inadequate use of nitrogen fertilisers, water deficiency, high temperatures during the kernel filling stage, etc. (Maksimović et al., 2001). Furthermore, many studies suggest differences in grain yield stability and adaptability of cultivars to environmental and growing conditions, as well as different cultivar responses to biotic and abiotic stresses (Lalić et al. 2010).

