

Improvement of spring wheat protein quality and quantity by mutation breeding

Saule Sagindikovna Kenzhebeyeva, Ravily Alybayeva, Saule Atabayeva, Gulina Doktirbai, Gulzhan Kaldybekkyzy, Saltanat Asrandina, Gulima Kaukaeva

Al-Farabi Kazakh National University, Kazakhstan
E-mail address: kenzhebaevas@mail.ru (S.S. Kenzhebeyeva).

Grain protein content (GPC) is one of the most important quality factors for pasta and bread wheat. Breeding for an increase in GPC is difficult because the genetic variation for this character is small compared to variations caused by the environment, besides there is a negative correlation between GPC and grain yield. We developed more productive compared to the parental cultivar on grain yield per plant, greater number of grain per main spike, greater grain weight per main spike mutant lines M4 spring wheat through gamma ray radiation. Initially, the original c. "Zhenis" was irradiated with 100 Gy on an ionizing device (PXM- γ 20, ^{60}Co gamma rays) at the Kazakh Nuclear Center. Selection of individual plants was done every generation from M3 taking into account the main components of productivity. The M4 lines along with the c. Zhenis were screened on GPC using a near-infrared spectrophotometer. Some M4 lines, no. 36(1), no. 24(1), no. 13(1), no. 13(3), no. 14(3) enhance the GPC with a mean value of 14.9%, 1.23% higher than the mean value of parent cultivar (12.1%). In these mutagenesis-derived high GPC lines relationships between GPC and spike productivity, and between GPC and plant grain productivity are positive. The mutant M4 line, no. 13(1) is characterized by the appearance of new gliadins subunit observed in SDS-PAGE pattern.

<http://dx.doi.org/10.1016/j.copbio.2013.05.247>

Improved quality of poppy seeds for human needs

Michaela Havrlentová¹, Andrea Hlinková², Jana Šupová¹, Adriana Bednárová², Darina Muchová¹, Mária Lichvárová¹

¹ Plant Production Research Centre Piešťany, Bratislavská cesta 122, 921 68 Piešťany, Slovak Republic

² University of Ss. Cyril and Methodius in Trnava, Námestie J. Herdu 2, 917 01 Trnava, Slovak Republic

E-mail address: havrlentova@vurv.sk (M. Havrlentová).

The main reason for poppy seeds utilization is alkaloids content for pharmaceutical industry. In Slovakia, poppy seeds breeding and cultivation are oriented in food industry for good quality of oily seeds. Linoleic, palmitic and oleic acids were dominant fatty acids in poppy oils. Statistically significant effects of locality and genotype on oil content and fatty acids profile were proved. Variation in analysed parameters was also influenced by the colour of seed; white-seeded poppies had the highest acid value (2.8% and 2.4% of free fatty acids) and blue-seeded the highest saponification value (186.98). Ochre cultivars contained the highest oil (51.15%) and linoleic acid (72.95%) levels and disposed by the highest PUFAs (73.9). Buddha, a high-morphine poppy cultivar, differed significantly in all monitored parameters (low lipid content, high free fatty acids level, etc.). High negative interrelation between linoleic and oleic acids levels was observed. Oil content was positively correlated with linoleic acid and negatively with oleic acid and yield of seeds.

Acknowledgements: Thanks to the project APVV-0248-10 selected poppy seeds cultivars are studied for their stability in food

industry and new plant materials with improved quality parameters are generate.

<http://dx.doi.org/10.1016/j.copbio.2013.05.248>

Purification and characterization of extracellular phytase from *Aspergillus niger*

Sayım Akturk, Hatice Korkmaz Güvenmez, Sadık Dinçer

Biology Department, Faculty of Science and Letters, Cukurova University, Adana, Turkey

E-mail address: sdincer@cu.edu.tr (S. Akturk).

Aspergillus niger isolated from agricultural soil. Extracellular phytase was produced under submerged fermentation conditions at 30°C in a medium containing cornstarch (2.8%) and glucose (0.5%) as carbon sources along with meat peptone (1.8%) as nitrogen source. Maximum phytase activity (0.50 FTU at pH 3.8) was obtained on the fifteenth day. The molecular weight of phytase was determined by SDS-PAGE 93 and 70 kDa. Phytase had optimal pH at 3.8 with temperature optimal at 70°C, respectively. The enzyme activity retained 50% after 5 min at 90°C. Phytase activity was not affected by most metal ions, inhibitors and organic solvents. Most of metal ions such as Ca^{2+} , Mg^{2+} , Zn^{2+} , Mn^{2+} stimulated phytase activity, while Hg^{2+} , Co^{2+} , Fe^{2+} were inhibited. Anionic detergent (SDS) and non-ionic detergents like Tween-20, Tween-80 and Triton-X-100 inhibited the enzyme. The enzyme displayed slightly higher activity when assayed with the calcium as opposed to sodium salt of phytic acid, and displayed significantly lesser activity when assayed using non-phytate-based phosphorylated substrates. The enzyme proved to be fairly specific for phytate, and the kinetic parameters for hydrolysis of sodium phytate were K_m 7.7 mM and V_{max} 5137.9 U/mL. Thus, phytase can be a potential candidate in animal nutrition due to its high activity and stability.

<http://dx.doi.org/10.1016/j.copbio.2013.05.249>

Heavy metal content of mixed feed used in laying hens feeding in different systems of production (conventional and organic)

Bologa Maria, Pop Ioan Mircea

University Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" Iași, Faculty of Animal Sciences, Romania

E-mail address: mary_shoa@yahoo.com (B. Maria).

From the many chemical substances polluting in the environment, which have different sources are presenting a great danger metals through their toxic potential not only to the environment but also for the health of animals and humans. Identifying and comparing the analysis of heavy metals content (lead, cadmium, copper and zinc) determined for samples of mixed feed collected from two units from Romania with different systems in hens egg production (conventional and organic), activity which ensure the safety and the innocuity of feed. For determination was used atomic absorption spectrophotometry method in flame (AAS) in order to standards and legislation. Statistical analysis, revealed significant differences between the mean values calculated for mixed feed samples derived from conventional system compared with the ecological one for lead (0.502 ± 0.045 mg/kg vs. 0.128 ± 0.012 mg/kg), cadmium (0.034 ± 0.002 mg/kg vs. 0.024 ± 0.002 mg/kg), copper (1.706 ± 0.053 mg/kg vs. 4.616 ± 0.197 mg/kg) and for zinc the differences were insignificant (3.748 ± 0.147 vs. 2.095 ± 0.048 mg/kg). The results show that the lead and cadmium values expressed in mg/kg (ppm) are below the maximum limits allowed by the legislation in force. Metal concentrations studied were different values,