Zemědělská fakulta
Faculty of Agriculture

Jihočeská univerzita v Českých Budějovicích
University of South Bohemia in České Budějovice

PROTOKOL O OBHAJOBĚ DIZERTAČNÍ PRÁCE DSP

Jméno studenta:	**KHOA DANG TRAN**
Narozen(a):	12. 12. 1979 Thua Thien - Hue
Studijní program:	Fytotechnika
Studijní obor:	Speciální produkce rostlinná
Forma studia:	Prezenční
Školící pracoviště:	KAES ZF JU v Č. Budějovicích
Datum a místo konání zkoušky:	11. 6. 2021, ZF JU v Českých Budějovicích
Zkušební termín č.:	1.

Název disertační práce:

Research on the Agronomic and Quality Characteristics of Modern Wheat Cultivars in Organic Farming

Výsledek obhajoby:

Prospěl (a) Lošák **Neprospěl (a)**

Zkušební komise:		**Podpis:**
Předseda:	prof. Ing. Tomáš Lošák, Ph.D.; Mendelova univerzita v Brně	Lošák
Členové:	prof. Ing. Ivana Capouchová, CSc.; ČZU v Praze **(oponentka)**	
	prof. Ing. Jan Moudrý, CSc.; ZF JU v Českých Budějovicích	OMLUVEN
	doc. Ing. Jan Moudrý, Ph.D.; ZF JU v Českých Budějovicích	
	Ing. Dagmar Janovská, Ph.D.; VÚRV, v.v.i. Praha	
	doc. Ing. Jana Pexová Kalinová, Ph.D.; ZF JU v Č. Budějovicích	
Oponenti: nejsou členy komise	prof. Ing. Magdalena Lacko Bartošová, Ph.D.; SPU Nitra	
	Ing. Zdeněk Štěrba, Ph.D.; ZF JU v Českých Budějovicích	
Školitel:	doc. Ing. Petr Konvalina, Ph.D.; ZF JU v Českých Budějovicích	

Zemědělská fakulta
Studijní oddělení
Studentská 1668, 370 05 České Budějovice
Česká republika

Vyřizuje:
Ing. Petra Jurásková
jurasek@zf.jcu.cz

+420 389 032 541
www.zf.jcu.cz
www.jcu.cz

Zemědělská fakulta
Faculty of Agriculture

Jihočeská univerzita v Českých Budějovicích
University of South Bohemia in České Budějovice

OBHAJOBA DIZERTAČNÍ PRÁCE DSP
PROTOKOL O HLASOVÁNÍ

Jméno studenta: **KHOA DANG TRAN**
Narozen(a): 12. 12. 1979 Thua Thien - Hue

Studijní program: Fytotechnika
Studijní obor: Speciální produkce rostlinná
Forma studia: Prezenční

Výsledek hlasování:

Počet členů komise: 6 — počet přítomných členů komise: 5

počet platných hlasů: 5 — kladných: 5

záporných: 0

počet neplatných hlasů: 0

Zkušební komise:		**Podpis:**
Předseda:	prof. Ing. Tomáš Lošák, Ph.D.; Mendelova univerzita v Brně	
Členové:	prof. Ing. Ivana Capouchová, CSc.; ČZU v Praze **(oponentka)**	
	prof. Ing. Jan Moudrý, CSc.; ZF JU v Českých Budějovicích	
	doc. Ing. Jan Moudrý, Ph.D.; ZF JU v Českých Budějovicích	
	Ing. Dagmar Janovská, Ph.D.; VÚRV, v.v.i. Praha	
	doc. Ing. Jana Pexová Kalinová, Ph.D.; ZF JU v Č. Budějovicích	

Zemědělská fakulta
Studijní oddělení
Studentská 1668, 370 05 České Budějovice
Česká republika

Vyřizuje:
Ing. Petra Jurásková
jurasek@zf.jcu.cz

+420 389 032 541
www.zf.jcu.cz
www.jcu.cz

Opponent 1:

Question: What seed category was used?

It belongs to Certified seed category at first generation (C1)

Question: Are these averages temperature and precipitation from all over the Czech Republic?

Answer: The average data of thirty years (1989 - 2019) was from the South Bohemia region and collected from Czech Hydrometeorological Institute.

Question: I was surprised by the below-average results of agronomic characteristics (including total grain yield) of the WIWA variety, which is bred specifically for cultivation in organic and low-input farming systems. What does the author explain? On the other hand, some results of technological quality were the best.

Answer: According to Central Institute for Supervising and Testing in Agriculture (UKZUZ), Wiwa variety came from Switzerland. It is very height plant, medium grain. Grain yield of Wiwa is low in organic farming, however the bakery quality is very good. This conclusion of UKZUZ is correct with our experiments. To comparison with the average yield of UKZUZ, the result in our experiments is lower by 2 ton.ha^{-1}. The reasons could be that:

- This variety was not adaptation with the soil and climate conditions in the location study. In detail, the weather condition in 2019 was suitable for wheat in general and for Wiwa in particular with the average yield in Zvikov being 5 ton.ha^{-1}.

- The soil fertility is dissimilar between Ceske Budejovice site and Zvikov site. Also, the soil fertility in our experiments is not as good as different places where UKZUZ did their experiment.

Question: How does the author explain the relatively significant difference in grain yield between the Zvikov and Ceske Budejovice habitats (almost 2 t.ha^{-1})?

Answer: I think that the significant difference in grain yield between the Zvikov and Ceske Budejovice habitats is that soil fertility is dissimilar between Ceske Budejovice site and Zvikov site. While Ceske Budejovice soil was pseudo gley cambisols, kind of soil-loamy sand soil, the Zvikov soil of experimental site was loamy soil. In addition, the experiment field in Zvikov is near the pond. Therefore, this place having the microclimate condition is better than place in Ceske Budejovice.

Question: Could the author of the dissertation briefly describe the health status of small-plot experiments in individual years, especially with regard to fungal diseases, were there any more serious problems?

Answer: In our experiment, the diseases and pets appearing during vegetation and development period were Glume blotch (*Phaeospheria norodum*), Stem rust (*Puccinia graminis*), Yellow rust (*Puccinia striiformis*), and Black faucet (*Oulema melanopus*). However, the infection percentage was not much, varying from 5 – 25 %. Most of varieties were resistance common disease as well as pests.

Question: The work showed a close relationship between the number of ears and grain yield. Does the author agree with the statement that in organic farming systems it is not possible to rely too much on the fertility of shoots and therefore the requirement to increase the sowing rate would be justified or not?

Answer: Yield was calculated by grain size, ears/m^2, and grains/ear. In our experiment, grains/ear was missing. Therefore, it is difficult to answer the question "Is it impossible to rely too much on the fertility of shoots". Theoretically, increasing the sowing rate would be gone up the yield. However, to know exactly the sowing rate with specific cultivar in organic farming, setting up the experiments field is necessary.

Opponent 2:

Question: In Literature review frequently occur opinions of some researchers, that "modern varieties are suitable for conventional farming, not for organic farming and low-input farming systems" or "almost any modern bred varieties of bread wheat being conventionally grown are not suitable for organic agriculture" and similarly. My question is that are these opinions still relevant and well-founded (in take into consideration present level of knowledge)? On the contrary to these opinions, some researchers suppose that modern high-yielding and high-quality conventionally bred wheat varieties are able to keep these properties even in organic farming; of course, on lower level of individual traits compared to conventional farming. What is author´s opinion on these issues?

Answer: This topic has been controversy nowadays. In my opinion, we can use the good varieties selecting in conventional farming to grow in organic farming. However, the seed conventional farming should evaluate VCU test in OF to ensure the stability of variety also the

ability compensate the loss. This method brings the benefit of economy. However, it is only temporary situation. In the future, application breeding wheat in organic farming will be necessary.

Question: In the part 4.3.1 author states that common wheat samples were milled into white flours using a PSY MP 20 and Quadrumat Junior machine. However, PSY MP 20 is laboratory hammer mill producing meal, not flour. With this comment is connected my question – why SDS test and not widely used Zeleny test that is a part of the Czech standard ČSN 46 1100-2 was used?

Answer: In our experiments, PSY MP 20 and Chopin CD1 were used. The reason of using SDS test is that the samples were collected from organic farming therefore we would like to analyze them with wholewheat, while Zeleny test is used for white flour. When analyzing correlations with Mixolab parameters, SDS test also shows significant correlations with stability and torque C2 as Zeleny test. Therefore, SDS test used in these experiments are suitable.

Question: In Table 9 author states that Falling Number value > 300 s means low enzymatic activity that result in dry crumb of bread and reduced loaf volume. Could author explain more exactly what is the reason of reduced loaf volume of bread at low activity of amylolytic enzymes?

Answer: α amylase activity is low which results in low bread volume and quality. When α amylase activity is optimal (FN 200 -300 s). It promotes the levels of fermentable and reduces sugars in flour. By degrading the damaged starch particles during the dough stage and generating low molecular weight dextrins α amylase facilitates maltose production by the endogenous β amylase. The maltose can be use as fermentable sugar by the yeast or the sourdough microbial population. Furthermore, α amylase may primarily affect dough viscosity during the initial stages of starch gelatinization by delaying the viscosity increase due to amylose leaching during gelatinization, amylases allow a prolonged oven spring and an increased loaf volume.

Question: It is not clear from Table 19 what mean factors 1 - 5?

Answer: Factors 1 - 5 mean eigen values. Factor 1 belongs to principal component 1, factor 2 belongs to principal component 2 and etc. The number of factors depend upon eigen values. In our experiment have five factors that is corresponding with five principal components. These factors were chosen having the eigen value ≥ 1.

Question: It is evident from Figure 6 that variety Gordian achieved the second highest yield, although on the basis of many research suggestions this type of variety (very low length of plants, low TKW, high number of spikes per m^2) should not be suitable for organic farming. My question is - would be possible to recommend this variety for organic cultivation? If yes, to which conditions and for which utilization would be this variety according to author´s opinion suitable?

Answer: We recommend expand this variety with the conditions as below:

- The organic fields have been conducted good crop rotation and farm management to avoid aggravation of weeds, pests, diseases.

- The organic fields have the moderate soil fertility.

- This variety is very low plant height which is able to resist lodging suitable with the locations having strong wind.

Opponent 3

Question: What are the targeted values for crude protein, wet gluten content and other evaluated parameters of winter wheat for bread making purposes?

Answer: For crude protein, this broad range in protein content suggests there are flours for different applications, including cakes and biscuits (lower values), breads (10 - 12%), and pastas and whole wheat bread (>14%) although the protein content suitable for bakery products should be between 10.5 and 13%. Gluten index is > 80%. SDS test is from 45 - 65 ml. The falling number being less than 300 s have the optimal activity as well as very good crumb of bread. Zeleny test is from 25 to 35 ml (good quality). Strong wheat flour has longer time C1 $\geq$ 3 min. Dough stability is $\geq$ 4 minutes. Good quality proteins are represented by C2 = 0.5 - 0.6 Nm.

Question: Describe the crop nutrition management in your experiments. What were the sources of nitrogen? Only N-fixation? What were the other sources of nutrients?

Answer: In our experiments, the crop nutrition management have been based on N-fixation through crop rotation. Crop rotation belongs to legume family, with broad bean (*Vicia faba*) grown in Ceske Budejovice, and common pea (*Pisum sativum*) grown in Zvikov. The other source can be from mineralization process.

Question: What can be the effect of "organic" plant nutrition sources on agronomic and quality parameters of wheat?

Answer: Crude protein content in grain dry matter is a qualitative parameter characterized by a significant difference of 2–3% between organic and conventional wheat. Crude protein content in grain dry matter to be 10.58% in organic varieties and 11.91% in conventional ones. Organic varieties amount to lower values of Zeleny test than conventional ones. Mean organic falling number was 364.1 s and the mean conventional one was 375.2 s. On the other hand, wheat varieties from organic growing were mainly characterized by significantly higher percentage of nutritionally valuable albumins and globulins (organic wheat in average 17.69%, conventional wheat 7.33%).

Question: What is the role of crop rotation and share of cereals on quality parameters of wheat in organic system?

Answer: Crop rotation is a fundamental systematic measure. Through suitable crop rotation, it is possible to maintain and improve soil, stabilize humification and mineralization processes, increase water and nutrient efficiency, microbial activity of soil and nitrogen intake, suppress attack by diseases and pests, reduce competition from weeds, increase biodiversity and stability of the agro-ecosystem and improve the efficiency of production. Crop rotation is a rational preventive measure. The right type of crop rotation can contribute to an increase in yield of 5 – 20% and reduces the need for material input.

The share of cereals on quality parameters of wheat in organic system should be accounted for 40 %. With this percentage, both yield and quality of wheat is good. However, farmers would like to increase to 60% because of the economic reason. This results from more diseases and low quality.