

Conference Proceedings

# Singapore

August 28-30, 2018

## IRSET

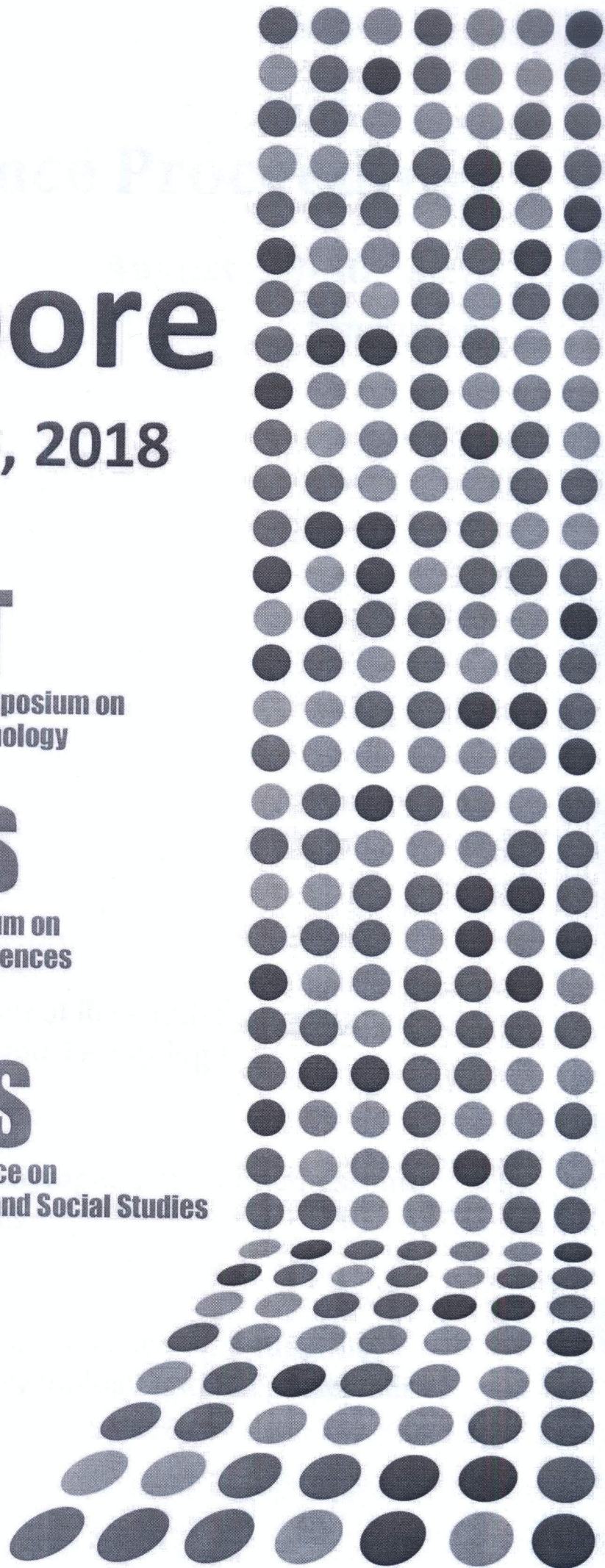
International Research Symposium on  
Engineering and Technology

## ISBSS

International Symposium on  
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**IRSET-0161**

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## IRSET-0161

### Evaluation of Spring Wheat Varieties' Resistance to Heavy Metals

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#### 1. Background

Currently, the ecologists around the world are paying more attention to the contamination of agronomic soils with heavy metals and their consequent adverse effect on the agro-ecosystems [1]. Large period of self-purification of soil and high cost of its artificial cleaning force humanity to find new ways of solving the problem of soils pollution with heavy metals. The most promising direction in this area is the study of genetic potential of plants and identification of plant objects, characterized by minimal accumulation of heavy metals [2]. In this regard, the aim of the study was the identification of wheat germplasm resistant to heavy metals (zinc, cadmium, copper and lead), priority pollutants in the East Kazakhstan region and identification of donors for metal resistance breeding and promising forms of wheat intended for introduction into production.

#### 2. Methods

The objects of research are various varieties of spring wheat from the collection of the East Kazakhstan Agriculture Research Institute (EKARI). The plants were grown on the scientific test site of the EKARI in conditions of natural pollution of the environment in East Kazakhstan region - metallurgical center of Kazakhstan. The following parameters were determined: the content of studied heavy metals in the soil of the root zone and in plant seeds, survival in spring-summer vegetation, productivity, elements of the yield structure. The content of heavy metals was determined by atomic absorption on an AAnalyst 300 "Perkin Elmer" device. Conducting experiments and physiological parameters were carried out by the method of field experiment.

#### 3. Results

Determination of heavy metals in the soil of the wheat plants root zone revealed that plants experience stress from polymetallic contamination of soils. The genotypic differentiation in the accumulation of heavy metals in plants seeds of various spring wheat varieties has been revealed

under conditions of environment polymetallic contamination. The lowest accumulation of zinc in seeds was found for the varieties of spring wheat Samal and Kutulukskaya, cadmium - varieties Ulbinka-25, Zaulbinka, copper - varieties Kutulukskaya and Ulbinka-25, lead - varieties Erythrosperrum-616 and Kutulukskaya. These varieties can be recommended for their further use in breeding for resistance to the relevant metals.

The study of ecological and physiological characteristics of plants makes it possible to identify forms successfully adapted to excess of heavy metals in soil under existing climatic conditions. Counting the percentage of survival showed that the greatest survival has Glubochanka variety. Also high viability is demonstrated by varieties of spring wheat: Zaulbinka, Omskaya-18, Ulbinka-25, Kutulukskaya. Harvest from the plot is greatest in spring wheat varieties: Ulbinka-25, Glubochanka and Erythrosperrum-616. This is due, apparently, to the large number of grains in the ear, the high mass of grain in the ear and the high productive bushiness and good survival in the period of spring-summer vegetation.

Carried out researches of physiological parameters and productivity of various genotypes of a winter wheat have allowed making the following conclusion. Ulbinka-25 and Omskaya-18 varieties can be recommended for cultivation on soil contaminated with cadmium, variety Ulbinka-25 - on soils contaminated with copper, variety Eritrosperrum-616 - on soils contaminated with lead, as these varieties of spring wheat accumulate the least of all relevant metals in seeds and at the same time are characterized by high yield and survival in spring-summer vegetation in conditions of polymetallic soil contamination. Some varieties can be recommended for cultivation on soils contaminated with several metals. Ulbinka-25 can be recommended for cultivation on soils contaminated with copper and cadmium, Kutulukskaya variety can be recommended for cultivation on soils contaminated with copper, lead and zinc.

Keywords: Wheat, Heavy metals, Metal resistance, Survival, Productivity, Promising forms.

#### 4. References

- [1] Oves, M., Khan, S.M., Qar,i H.A., Felemban, N.M., Almeelbi, T. (2016). Heavy Metals: Biological Importance and Detoxification Strategies. *J Bioremed Biodeg.*, 7:334. doi: 10.4172/2155-6199.1000334.
- [2] Molchan, I.M. (1996). Selective-genetic aspects of reducing eco-toxicants' content in crop production. *Agr. Biol.*, № 1, - P. 55-66.