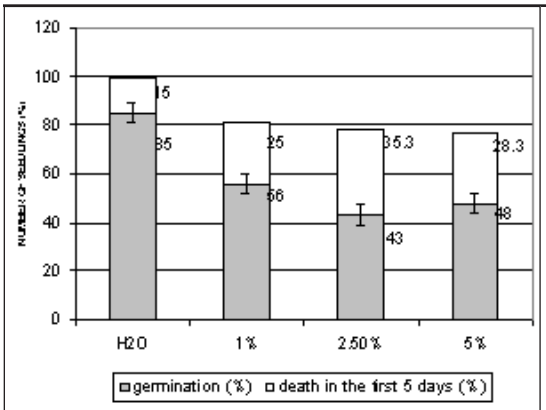

Fig. 2. Germination (%) and the number of dead seedlings after the first five days for different concentrations of encapsulation solutions (Control is H_2O only).

For the first seven days, a plant is nourished from the seed. For this reason, after four days H_2O-treated seedlings overtake encapsulated treated seeds by more then 20%. But at nine days after germination, encapsulated seeds begin to overtake the control plants in proportion to the treatment (Fig. 3).

Using seed encapsulation under soil stress conditions (at a high concentration of Al ions in the soil solution) reduces the negative effect of the high concentration of NPK in the treated seeds. At an increase in the soil solution of the aluminum ions in an encapsulation solution renders a protective effect, causing formation of Al complexes and an increase in seedling growth.

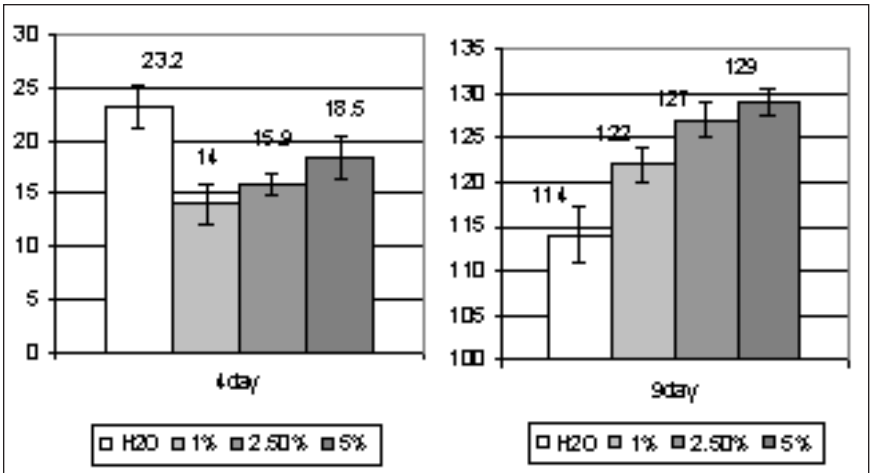

Fig. 3. Length of seedlings (mm) after four and nine days growth for different concentrations of encapsulation solutions (Control is H_2O only).

SARATOV STATE AGRARIAN UNIVERSITY NAMED AFTER N.I. VAVILOV
Department of Biotechnology, Plant Breeding and Genetics, 1 Teatralnaya Sg., Saratov, 410012. Russian Federation.

Estimating different kinds and lines of spring bread wheat for total resistance to fungus diseases.

A.Yu. Buyenkov, N.V. Stupina, L.G. Kurasova, and Yu.V. Lobachev.

Since 2005, we estimated the resistance of material for loose smut, powdery mildew, and leaf and stem rust in the city of Saratov, Russian Federation. The total resistance to all investigated pathotypes of loose smut have shown that the cultivars Zhigulevskaya and Saratovskaya 70 and lines L658-01 and L2040 are most resistant. The cultivars Lutescens 62, Dobrinja, L503, and L504 were susceptible to all the investigated patotypes. Other cultivars showed race-specific resistance.

A pedigree analysis of the cultivars with sources of resistance to any pathotype of loose smut included *T. turgidum* subsps. *durum, dicoccum,* and *turgidum, T. timopheevi* subsp. *timopheevii,* and *Elytrigia intermedia* and also the cultivars Krimka (a local winter wheat cultivar from Ukraine), Ostka Halisijskaza (a spring bread wheat from Poland),

Selivanovskij Rusak (a local spring bread wheat cultivar from the Volga region), and Beloturka (a local durum cultivar from the Volga region).

Resistance also was studied to leaf and stem rust and powdery mildew in spring bread wheat. Lines selected carrying alien genes that would ensure total resistance to leaf and stem rust and powdery mildew were L2166 and L784/03; for resistance to leaf and stem rust was L2075; for resistance to leaf rust and powdery mildew were Мульти 6R, L2505, L1059, L484/03, and L487/03; for resistance to leaf rust were L1078, L2608, and L2870; and for resistance to powdery mildew was L2032. The donors of resistance to these diseases are *Ae. speltoides, S. cereale, Th. intermedium,* and *T. turgidum subsps. durum* and *dicoccoides*.

VAVILOV INSTITUTE OF GENERAL GENETICS, RUSSIAN ACADEMY OF SCIENCES
Gubkin str. 3, 119991 Moscow, Russian Federation.

SHEMYAKIN AND OVCHINNIKOV INSTITUTE OF BIOORGANIC CHEMISTRY, RUSSIAN ACADEMY OF SCIENCES
Ul. Miklukho-Maklaya 16/10, Moscow, Russian Federation.

Novel antimicrobial peptides from seeds of Triticum kiharae and Leymus arenarius.

L.L. Utkina, A.A. Slavokhotova, T.I. Odintsova, T.V. Korostyleva, and V.A. Pukhalskiy (Vavilov Institute of General Genetics) and A.K. Musolyamov and T.A. Egorov (Shemyakin and Ovchinnikov Institute of Bioorganic Chemistry).

To protect themselves against pathogens, plants produce a wide array of antimicrobial proteins and peptides (AMPs), some of which are synthesized constitutively, whereas others are induced upon challenge with pathogenic microorganisms (Selitrennikoff 2001; Garcia-Olmedo et al. 2001). Each plant genome encodes hundreds AMPs (Manners 2007). Such biodiversity ensures efficient defense against numerous invading and constantly evolving microorganisms. Most plant AMPs belong to cysteine-rich peptides and contain an even number of cysteine residues, all of which are involved in the formation of intrachain disulphide bridges providing their molecules with high structural stability. Based on cysteine spacing motifs and three-dimensional structures several families of antimicrobial peptides have been discriminated in plants (Broekaert 1997). Hevein-type peptides show structural similarity to the 43-amino-acid residue chitin-binding peptide isolated from the rubber tree *Hevea brasiliensis* L. (Van Parijs et al. 1991) and comprise the single-hevein-domain subfamily in a large group of chitin-binding proteins implicated in plant defense (Raikhel and Lee 1993). Despite sequence similarity, hevein-type AMPs differ in the number of disulphide bonds. Most of them possess 8 cysteine residues forming 4 disulphide bonds and in this respect are close to the chitin-binding domains of class I/IV chitinases (Beintema 1994). Truncated variants with only six cysteine residues also occur (Broekaert et al. 1992). AMPs are regarded as promising agents for plant transformation and production of resistant crops, therefore the search for new, highly potent AMPs is a rapidly developing area of research.

We focused on AMPs from seeds of two Poaceae species, *Leymus arenarius* and *Triticum kiharae*. In contrast to *T. kiharae*, *L. arenarius* grows in a narrow shore region of the White Sea at high soil salinity. We show that both species possess highly homologous hevein-type peptides of unusual structure, which effectively inhibits growth of a wide range of plant pathogens at micromolar concentrations.

Materials and methods. The species used in this study were *T. kiharae* Dorof. et Migush. and *L. arenarius*; the fungi and bacteria *Fusarium solani* VKM F-142, *F. verticillioides* VKM F-670, *F. oxysporum* TSA-4, *Botrytis cinerea* VKM F-85, *Neurospora crassa* VKM F-184, *Pseudomonas syringae* VKM B-1546, *Clavibacter michiganense* subsp. *michiganense* VKM Ac-1144, and *Erwinia carotovora* subsp. *carotovora* VKM B-1247 were obtained from the All-Russian Collection of Microorganisms.

Flour was extracted with 10% acetic acid for 1 h at room temperature and desalted on an Aquapore RP300 column. Freeze-dried acidic extract was subjected to chromatography on Heparin Sepharose. Proteins and peptides were