FIRST INTERNATIONAL TRANSCAUCASUS CONFERENCE ON PLANT PATHOLOGY

ABSTRACTS BOOK

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The objective of First International Trans Caucasus Conference on Plant Pathology is to review the current status of Plant Protection research in the region and to develop a forum for information exchange and cooperative regional and international activities.

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The present publication consisting of Russian and English parts comprises abstracts of the oral and poster presentations for ITCPP. The abstracts are arranged in topics and according to the conference program and ordered by the last name of the First author.

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WORKSHOP

SHOT HOLE DISEASE OF STONEFRUITS IN THE REPUBLIC OF ARMENIA

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Recent surveys have shown that apricot and plum are often heavily infected with shot hole caused by the fungus *Clasterosporium carpophilum (Lev.) Ader.* During the period 2002 – 2005, contamination of leaves of apricot ranged from 42 up to 53.7%, and on fruits from 40 – 43%. For plum, leaf infection was 46 – 56%.

In fungicide trials, autumn applications of Kuproksat gave a 7.8% increase in control compared with 2% for spring applications when combined with Topaz. For apricot fruits, the untreated controls showed 69% contamination. Fungicides were active for up to 20 days after the last spraying.

The optimum treatment for apricot was with Topaz (0.4 L/ha) and Scor (0.2 L/ha) plus a further Topaz application (0.4 L/ha) immediately after petal fall, with a previous autumn spraying with Kuproksat. This gave up to 93% increase in yield.

Statistical analysis was based on the method of disperse analysis.

PATHOGENIC FUNGI ON CITRUS FRUIT IN WESTERN GEORGIA

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Wet subtropical climate of Western Georgia, frequent rainfalls thought the whole year provide favorable conditions for citrus fruits diseases development. Citrus fruits are infected by many fungi diseases, and most of them infect plant organs already in the plantations, and later they are developed on the fruits. Some of the fungi are considered to be typical organism of fruit. They significantly reduce the yielding and provide the economic loss of fruit value.

Great yield loss on citrus crops is caused by the following fungi:

Elsinoe fawcetii, which causes wart or Scab of citrus fruits. Fruits are diseased in the fields. Blotches appear on the fruits (single or in groups). Such fruits are deformed and do not reach normal sizes. Surveys of many years showed that diseases are fixed annually. They are fixed in all citrus plant regions and their incidence in different years is 18-28%, but in the location of disease - 35-40%.

Glomerella cingulata - Grey mould or Anthracnose causes root decaying in ripening stage. A disease appears in the places of stem fixing, causing small brown lesions which become bigger, join to each other and take a round form. Infected fruits become soft and are covered with grayish-black mycelium fur. The infection increases especially when rainy and wet condition exists, and, thus, the disease becomes more harmful and reaches 20-22%.

Botryotinia fuckeliana - Gray mould. The disease is characterized with high severity as in the field conditions, so in storage ones. Small brown lesions appear on infected fruits. In wet conditions the fruits are covered by grayish mycelium, on which conidial fungi fruit-bearing appear as small shrubs. Incidence percentage in different years is 10-15%.

Phytophtora citrophthora - citrus fruits are infected as in plantations, so in storage conditions. Brown spots appear on fruits, which develop very quickly. The whole fruit becomes brown and looks like burnt one. Diseased fruits fall down easily, but in damp conditions they are covered with white airy fur, and have specific, unpleasant scent. Rapid development of the disease happens in wet conditions. Incidence percentage is 12-15%.

Alternaria citri – fungi cause Black Rot or Alternariose of Citrus fruits. As ripe, so unripe fruits of lemon, tangerine and orange are infected. In this case, the infection takes place in the period of infructescense. Spore shoots penetrate into the ovary through stigma and develop inside parallel to the fruit development. Precipitations are favorable for massive incidence. When conditions are favorable for fungus development, the disease reches 15-20%.

SPREAD OF FUSARIUM EAR BLIGHT OF SPRING BARLEY IN BELARUS AND MEANS OF ITS LIMITATION

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At the end of XX beginning of XXI century more often in spring barley the outbreaks of *Fusarium ear blight* are marked (the agents are fungi of *Fusarium* Link: Fr.genus). In the process of perennial mycological researches the workers of phytopathology lab of the RUC «Institute of Plant Protection» have isolated 11 *Fusarium* spp. from spring barley tissues. However, on the crop dominate the fungi *Fusarium culmorum* (W.G.Sm.) Sacc., *Fusarium oxysporum* (Schlecht.) Snyd. et Hans., *Fusarium poae* (Peck.) Wr.

The highest primary inhibiting effect of infestation and spring barley Fusarium ear blight development at paste ripeness stage in 2005 is characteristic for the variants with the use of following fungicides composed of tebuconasole: Folicur BT, EC (the biological efficiency 73,1%) and Prozaro, EC – 81,1%; in 2006 – Folicur BT, EC (the biological efficiency 84,4%); Prozaro, EC – 88,6% and Impact super, WC – 81,3%.

An important aspect for crop protection against the diseases is a fungicide ability to inhibit the development of pathogens at initial stage as it is seen from the variant with Folicur BT, EC; Impact super, WC, but at the same time the preparation is to preserve the fungicidal activity as long as possible, for this, providing a prolonged ear protection before harvest – as in the variant with Prozaro, EC; Rex DUO, SC; Bumper super, SC. Indices of the fungicide Orius 250, WE (tebuconasole, 250 g/l) and Bumper super, SC (propiconasole, 90 g/l + prochloraz, 400 g/l) have got much lower biological efficiency under 2005 conditions.

CURRENT CEREAL RUST RESEARCH AT THE USDA CEREAL DISEASE LABORATORY, WITH SPECIAL EMPHASIS ON Ug 99 WHEAT STEM RUST

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The USDA Cereal Disease Laboratory is the primary USDA facility conducting research on leaf and stem rust diseases of wheat, oats and barley in the U.S. Research ranges from very applied, such as screening of uniform regional nurseries for rust resistance, to fundamental work on genomics of wheat stem rust, *Puccinia graminis* f. sp. *tritici*. Population studies of cereal rusts include annual race surveys of stem rust of wheat, barley and oats, leaf rust of wheat (*P. triticina*) and crown rust of oats (*P. coronata*) from across the U. S. We have recently developed microsatellite (SSR) markers for these fungi to enhance our study of cereal rust populations. This work is providing insight into the population structure and the mechanisms by which new pathotypes or races evolve. The laboratory has been in the forefront in the response to the Ug99 wheat stem rust crisis in East Africa, being involved in monitoring the spread of Ug99 and searching for effective resistance to combat it. The high degree of vulnerability of wheat cultivars to this new, highly virulent strain of stem rust in both developing and developed countries should be of great concern given short grain supplies and soaring food prices worldwide. The recent evolution of new virulences within the Ug99 lineage of stem rust has further reduced the number of effective resistance genes available in adapted germplasm. Based on microsatellite markers, the Ug99 lineage appears to be genetically very distinct from other isolates of stem rust in our international collections.

THE MATERIALS ABOUT STUDY DISEASES OF GRAMINEOUS DECORATIVE PLANTS ON THE BLACK SEA COAST IN ADJARA

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There are lots of species, breeds and forms of gramineous decorative plants spread on the Black Sea coast of Adjara. They are widely used for decorating gardens, parks, squares, flower-beds. One of their restrictive – developing factors are fungal diseases, which are broadly spread in warm and damp climate conditions and this is the reason of plants weakening, decline of their decorative value, and sometimes this is the basic reason of mass wither.

On the basis of many years researches we have identified from various systematic groups 86 species of fungus that causes diseases of the gramaneous decorative plants. Among the diseases that they cause, especially corrupt are grey foul brood, rot of roots, spots and others.

From the fungus that cause grey foul brood, *Botrytis cinerea* Pers is widely spread. It is discovered 16 species of plants. It is remarkable of foul brood intensive development of dahlia, agava, iris, auricula, daisy, that is displayed as a flowers, buds, fleshes, bulbs rot. Fungus *B paeniae* Oud – reason of paeonia's organs rot and others.

The rot of root is basically caused by *Fusarium* breed of fungus. It is displayed 11 species of *Fusarium* breed on 21 species of plants. The spots of plants are caused by different groups of fungus. The diseases are usually showed on leaves, sometimes on the other parts of plants. It is vastly spread and especially corruptive are *Alternaria dianthi* Stac. et Hall, *Cercospora Althaenia* Sacc, *Coniotherium agaves* sacc, red spots of *Stagonospora curtisii* and others.

OCCURRENCE AND VIRULENCE STRUCTURE OF WHEAT POWDERY MILDEW IN GEORGIA

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The causal agent of wheat Powdery mildew, *Blumeria (Erysiphe) graminis f.sp.tritici* has been developed annually in Georgia. Results of surveys of wheat fields in different regions showed that optimal conditions for Powdery mildew development exist in Georgia. Incidence of Powdery mildew varied between 1-80 % depending on region and variety. Diseased leaf samples with conidia of pathogen from ten regions of five geographic zones, totally 484 single-colony (SCI) isolates, were analyzed on differential set carrying 12 resistance genes.

The result of the identification of virulence structure of *Blumeria (Erysiphe) graminis* population showed that the genofond of virulence in quite representative. Out of the 12 genes analyzed the population consists of 7 virulence genes. Virulence frequencies to Pm 1, Pm 3a, Pm 3c, Pm 4b, Pm 5, Pm 6 and Pm 8 were close to 100%.

Virulence to genes Pm 2 (5.8%), Pm 3b (2.1%), Pm3d (2.6%), Pm 4a (0.5%) were occurred rarely. Frequency of virulence gene Pm 7 increased from 26.7% to 56.8%.

In total twenty pathotypes were identified in population. The dominant pathotype was expressed with virulence formula 2,3b,3d,4a/1,3a,3c,4b,5,6,7,8. Frequency of prevalent pathotype was 65.5%.

Thus, Georgian population of the causal agent of wheat powdery mildew is quite virulent.
While comparing the obtained results with virulence data in other countries (Switzerland, Bulgaria, Denmark, Germany, Hungary) it appeared to be that Georgian population is similar to them constaining the effective genes - Pm3b, Pm3d, Pm4 and very high virulence to Pm1, Pm3a, Pm3c, Pm5, Pm6, Pm8.

SPREADING AND HARM OF DISEASES OF MEDICINAL PLANTS

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Disease types of medicinal plants families of *Asteraceae, Lamiaceae, Fabaceae* and others are described. Micromycetes genera of *Cercospora, Septoria, Phyllosticta, Colletotrischum,, Ramularia, Peronospora, Macrosporium, Alternaria, Phytophtora* and others cause spottiness. Fungi genera of *Fusarium, Phytophtora, Alternaria, Helminthosporium* cause root rottenness. *Erysiphe and Sphaerotheca* cause mealiness. *Puccinia, Uromyces, Coleosporium and Phragmidium* causes mildew.

Virus diseases affect *Plantago major L., Echinacea purpurea (L.) Moench, Mentha piperita L, Valeriana officinalis L, Ammi visnaga (L.) Lam.* in some years.

Diseases do 25-60% loss of overground part mass and 25-35% loss of underground organs.

To protect medicinal plants from diseases we use agrotechnical measures, biological and chemical methods.

MONITORING OF CITRUS DRYING

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Drying of citrus is widely spread in the west Georgia, in the moist subtropical zone (Azhara, Abkhazia, Guria and Megrelia). The reason of the drying may be: different micro-organisms (fungi, bacteria, and viruses), soil-climatic circumstances, and wrong agrotecnics. Just therefore the citrus Monitoring is necessary by all means.

The whole drying of citrus is recalled by tracheomycotic organisms and by root rotting provocative fungi. We had studied the citrus root rot. We carried the monitoring according to the conclusion of the disease circulation. We used to observe the young and old plants: lemon, tangerine, orange. The drying is also changed according to the years. The citrus root rot is widely spread in Georgia citrusing districts in 2004-2006. The drying of the plants are the results of root rotting that is mostly mentioned late in spring and summer, lout in single cases it is noticed in autumn and even in Winter. The drying is of a chronically character. It was concluded that the drying is mostly remarkable in already grown mandarin trees, in entire-harvest plantations as the industrial plantations in our country are mainly represented with tangarine. The whole drying is denoted, when the entire system of roots is fallen ill. The root rot of tangarine is spread in Makhinjauri, Chakvi, Tsikhisdziri and Ureki citrus farms and in Megrelia as well, i.e in every district where citrus grows. It is concluded that root rot Makhinjauri citrus farm in 2004-2006 is 14,6-17,6%; in Chakvi – 16,4-20,4%; In Tsikhisdziri 19,3-23,6% and in Ureki farm 23,5-26,9%.

We came to the conclusion that the root rot of citrus are provoked by the following Fungi: *Fusarium oxysporum* Schlecht. emend. Snyd et Hans; *Fusarium javanicum* Koord. *Var radicacola* and *Gliocladium roseum* Bain.

THE BACTERIAL CANKER OF VINE IN GEORGIA

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Viticulture is one of the main branches of Georgia's agriculture. By its varied production it plays an important part in the country's economy. One of the considerable reserves for increasing the vine capacity is elimination of the thinness of the vineyards caused by diseases, very harmful among which being the bacterial canker. This chronic disease caused by the polyphagous bacterium *Agrobacterium tumefaciens (Smith et Townsend) Conn*.

The bacterial canker of vine is object of our investigations for the space of many years. During that long period of investigation of the disease, it was established by us that the bacterial canker is widespread in the main vine-growing regions of Georgia.

The bacterial canker damages basically the overground organs of vine. The tumors are found near the root neck, on the trunk and on the sprouts. On the roots and on the annual sprouts, they are found less frequently. The causative agents of the disease were isolated from different organs of diseased and externally sound vines. That points to the presence of the pathogene in the plants and to its long-term remaining in them in a state of latency. The pathogenes were isolated from xylem exudates, tumors, and rhyzosphere. The taxonomy of the causative agents has been established – they have been identified as *Agrobacterium tumefaciens*.

Many investigators, including us, are constantly carrying out works for the purpose of developing new effective measures against the bacterial canker of vine.

The bacterial canker is a most aggressive disease; its causative agent retains well its vital activity in soil, diseased plants, and plant residues. That is the reason why combating it is very difficult to carry out and needs different, of a complex character, approaches to the problem. The system of measures must include agrotechnical, phytosanitary, chemical, biological and other methods.

TAN SPOT OF WHEAT IN GEORGIA

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Tan spot of wheat, caused by the ascomicete *Pyrenophora tritici-repentis* (Died.) Drechsl., anamorph *Drechslera tritici- repentis* (Died.) Shoem. occurs to all the major wheat growing areas worldwide and is a destructive and serious damage pathogen in the world.

In Georgia Tan spot has been registered in 1992. But since 2000 it has been studied in Georgian Institute of Plant Immunity. Disease monitoring was conducted annually in different geographical areas of Georgia during 2000-2007. Results of surveys showed, that Tan spot has been recorded and mostly distributed in all investigated regions.

Samples collection and agent's identification was made using classical method. It is determined that fungus conidia are shorter and wider on natural material and the most part of basal cell conidia in vivo had a shape of " Shake's head", which is one of the main diagnostic features described in scientific literature. Spores in vitro are very much prolonged, thinned and basal cell has a shape of nipple as it is indicated by many authors.

Morphological- cultural features have been studied on media V-4. One fungus morph type has been identified. It indicates of pathogens population homogeneousity in Georgia.

POWDERY MILDEW OF PEACH AND ITS CONTROL IN THE REPUBLIC OF ARMENIA

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Powdery mildew of peach *(Sphaerotheca pannosa* Lev. *var. persicae* Woronich*)* is a widespread harmful disease. It becomes clear that with the increase in age of leaves both contamination, and development of diseases are decreasing and the infection is not developing on the leaves elder 20 days. From the tested preparations Topaz and Rubigan were the most effective on the foetus of peach (90.5 - 91.0% biological efficacy).

Spraying with bioliquid instead of ordinary water is one of the decisions of application. Preparations were applied in 0.6 and 0.8 L or kg per hectare. The bioliquid (instead of ordinary water) was also tested in the same norms. In comparison with the control susceptibility to infection of foetuses in a variant of Topaz (0.6 L/ha) was decreased 5.4 times, in a variant of Topaz (0.6 L/ha) plus bioliquid – 7.6 times. Efficacy of treatment with bioliquid was achieved up to 90% that is 8 – 10 % more, than with ordinary water. In variants of Topaz (0, 8 L/h) susceptibility to infection of foetuses decreased 9.6 – 10.0 times in comparison with the control, biological efficacy was 90.2 – 91.1 %, that is in variants a Topaz of 0.6 L/ha + bioliquid, where norm of the charge of a Topaz was actually reduced, on 25% provided the same efficiency, that in a variant a Topaz of 0,8 L/ha was provided approximately.

Approximately the same mechanism is noted in variant of Rubigan.
Application of a bioliquid gives an opportunity to decrease the norms of preparations on 25%, providing high biological efficacy.

SPECIFIC COMPOSITION OF PATHOGENS OF WINTER WHEAT SEEDS IN FOREST-STEPPE OF UKRAINE

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Mycoflora of affected heads in Forest-steppe of Ukraine is presented with typical saprophytes and semiparasites being widely spreaded in this zone on plants, crop residues, and in soil. In 2007 from heads picked in fields of Myronivka Institute of Wheat there was been singled out and identified 12 fungi species which belong to 5 genera, 4 families, 2 orders and 2 classes of division true fungi (*Eumycota*): *Mucor mucedo, Penicillium viridicatum, P.expansum, Alternaria alternata, A. tenusina, Cladosporium herbarum, Fusarium sporotrichiella, F. oxysporum, F. moniliforme, F. culmorum, F. graminearum, F. gibbosum. F. graminearum* was the most widespread species among *Fusarium* genus.

Epiphytic mycoflora development level is strongly depended on plant growth phase, air humidity, soil type, fall amount and displays different indices in various years. Sometimes a winter wheat field during maturation would “get black” literally in 2-3 days after heavy rain that results in significant grain yield crop losses and deterioration of its quality.

THE ROLE OF THE VEGETABLE PLANT SEEDS IN DISSEMINATION OF THE FUNGAL DISEASES

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A seed is a complex biological system in the plant kingdom. There is complex interrelation between a seed, shoot, and adult plant, because quality of a seed determines viability and productivity of the plant. These have respective importance in the agriculture. A seed may possess both internal and external infection and therefore, often, it represents a major source of infection dissemination.

In the studies performed in 1993-2003, in the Imereti region, a quantitative ratio of various fungi, found in the vegetable cultures, against the fungi found on the host plant seeds, has been the following: on the tomatoes – 72.4%, on the eggplant– 65.3%, and on the capsicum – 72.7%. The quantitative ratio of the fungal species found on the same vegetable cultures, against the pathogenic fungal species found on the host plants, amounted, respectively – on the tomatoes – 74.3%, eggplant – 65.5%, and on the capsicum – 76.9%.

It was determined that out of the 22 genera of fungi found on the tomato seeds, representatives of 3 genera, or 13.6%, induced internal infection of the seeds, while out of the 28 species of fungi, 8 species, 28.5%, are the agents of internal infection in the seeds. In the eggplant, above indices amounted 35.2% and 23.5%, respectively. In the capsicums – 18.3% and 26.6%, respectively.

The fungi, which induce internal infection in the vegetable cultures, oftentimes do not show visually any symptoms of changes in the seeds and remain in hidden or latent state. With an aid of the paraffining method, number of the fungi, revealed according to the latent infections, in tomatoes, eggplants, and capsicums, amounted 11.3%, 8.1%, and 7.7%, respectively.

In the shoots of the infested tomatoes, during various experimental conditions, the fungi *Phytophtora infestans, Ph. parasitica, Alternaria solani, Fulvia fulva, Fusarium oxysporum* and *Verticillium albo-atrum* were found; on the eggplant seeds – *Phomopsis vexans, Fusarium oxysporum, Verticillium albo-atrum*; on the capsicum seeds – *Phytophtora capsici, Alternaria solani, Verticillium albo-atrum, Fulvia fulvia, Fusarium oxysporum.*

PHYTOPATHOLOGIC SITUATION ON WHEAT CROPS IN THE INFERIOR VOLGA REGION: THE CONDITION AND PROSPECTS

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In the Inferior Volga region wheat among other grain cultures occupies the greatest specific weight (35 %), including on the Saratov range - 39 %. In region on wheat the most hazardous diseases of grain cultures are distributed: leaf rust, powdery mildew, root rots, a smut and an ergot. In last years intensifying a role of a Septoriose is revealed, potential hazard is represented with Fusarium head blight. Can show and periodically strongly developed the virus diseases, including barley yellow dwarf virus, other species of rust (stripe, stem). Amplified exhibiting disease under the name blacken an ear is revealed. To this promotes, that the saturation of crop rotations grain crops achieves 60 % and more, and it frames the favorable conditions for development of various diseases. Most effectively on a background of low productivity of a grain of wheat in comparison with Boreal Caucasus application first of all, complexes of agrotechnical measures on protection of plants. The chemical crop protection should be considered as an additional element in the general system of wheat protection. Important point of the integrated protection is breeding and cultivation of cultures with differing resistance to diseases.

In order of wheat protection from phytopathogenes of a wheaten field we together with All-Russia a research institute of a phytopathology develop and approve system of protective measures of wheat from rust and other diseases (septoriose, powdery mildew) which is corrected with the count of the general phytosanitary optimization of a plant growing.

VINE DISEASES IN GEORGIA

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Georgia is rich in biodiversity of Georgian autochthonous varieties and it is classical country of Vine-making. In 2004-2006 the incidence and severity of vine diseases were monitored in four viticulture zones of Georgia: Kakheti, Kartli, Imereti, and Humid Subtropics. The following diseases of vine were detected: Anthracnose (*Elsinoe ampelina*), Downy Mildew (*Plasmopara viticola*), Powdery Mildew (*Uncinula necator*), White rot (*Coniella diplodiella*), and Gray mold (*Botrytis cinerea*), Phomopsis cane and leaf spot (*Pomopsis viticola*). As a result of conducted surveys the major and economically important diseases are Downy Mildew and Anthracnose. These diseases were occurred in all investigated zones and regions. Nearly all commercials (Rkashtiteli, Saperavi, Aladasturi, Odjaleshi, Tcholikauri), aboriginals (Kamuri, Khikhvi, Kabashi) and introduced (Isabella shavi, Isabella tetri, Isabella tchiteli, Veluri amerikuli) were infected by Downy Mildew and Anthracnose. Incidence of Downy Mildew and Anthracnose was between 60-80 %. But it is mentioned that Anthracnose has been distributed more widely in Western Georgia than Downy Mildew. Because of early infection and favorable conditions during growing seasons very high incidence and severity of Anthracnose were indicated here in 2004. Accordingly, it caused yield losses which reached 80 %. In case of pesticides using severity of both diseases decreased but in Georgia the level of pesticides usage is low.

NORTHERN CORN LEAF BLIGHT IN GEORGIA IN 2004 – 2007

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Northern corn leaf blight caused by fungus *Setosphaeria turcica* (Luttrell) K.I. Leonard E.G. Suggs (anamorph: *Exserohilum turcicum* (Pass.)K.I. Leonard E.G. Suggs= *Helmintosporium turcicum* (Pass.) occupies the definite ecological place niche in the local biotcenoze. Northern corn leaf blight was dominant disease. It was indicated nearly in every region of the Western Georgia (40-90 %) and in Khashuri region - 30 % (in the Eastern Georgia) was observed in the as on white and yellow maize too. The severity of disease in 2004 was 80-100 %; in 2005 -20-45 %. But in 2006 and 2007 it was lower, 40 – 37 %, respectively. The reason is – weather conditions in period 2005 – 2007. High temperature (to 35^0C) and very low moderate air humidity (<70%) were not favorable for disease development. During these years the first symptoms of disease were indicated in middle of August.

VIRULENCE OF WHEAT STEM RUST IN GEORGIA

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Wheat stem rust is widely spread throughout the world. The most effective and ecologically safe method of wheat protection from Rust is cultivation of rust resistant wheat varieties. Genetic analysis of spectrum of pathogen population virulence is very significant in breeding for resistance of wheat. But it is necessary to improve resistant varieties periodically, as in several years, because of separate races adaptation or new ones appearing they might lose resistance and might highly infected.

Surveys of virulence showed that wheat stem rust distribution in Georgia varied between episodically and 80%; severe infection is observed rarely.

506 monopustule isolates have been analised for the last 3 years. Population virulence structure was studied on International differential set consisting of 40 varieties and isogenic lines, having the following resistant genes: Sr pp12,13,22,24,25,26,27,31,32,33,35. Analysis of virulence genefond of P. *graminis f. sp. tritici* showed that population contains the most part of virulence genes. Virulence to Sr genes 12, 13, 22, 24, 25, 26, 27, 31, 32, 33, 35, Agi, Khapli was not registered in population. Genes pp6,7,7a,8,8a,Bb,9a 9b,9f, 10,11,14,21,29- were fixed rarely or with low intensity – 03-21,1%. Virulence to Reliance (5,16,18,20), 9d (Arnautka, Mindum, Spelmar), 9g(Kubanka, Acme), Little club, Kota, Marquis were indicated constantly or with high frequency – 98,2-100% and frequency of pp1,5(PrelxRel), 7b,9e,17,23,29,30,34 were moderately – 21,6%-64,3%. Population is characterized by diversity of pathotype composite. In total 46 pathotypes have been registered by Pgt system.

Thus, population of stem rust is highly virulent and differs from populations of other countries on frequency of some virulence genes. A new aggressive race of wheat Stem Rust Ug-99, which infects wheat varieties with genes Sr 31, did not registered In Georgia yet.

SURVEY OF WHEAT RUSTS VIRULENCE IN GEORGIA

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Leaf Rust (causal agent *Puccinia triticina* Eriks), Stripe Rust (causal agent *Puccinia striiformis*) and Stem rust (causal agent *Puccinia graminis*) are the most distributed and harmful wheat diseases in Georgia. Observations of wheat fields and virulence surveys of rusts have been conducted by Institute of Plant Immunity staff annually. Rus

The virulence survey was based on monopustule isolates. The urediniospores from each leaf were transferred to a universally susceptible genotype and from the developing uredinia one monopustule-isolates were obtained .Urediniospores from single uredinia were increased and collected separately 2-4 days later, after that the spore water suspensions of each isolates were applied to inoculate onto the first leaf seedlings of the differential host series of near isogenic line. From 12 to 16 days after inoculation infection types were scored (Roelfs et all, 1992). Virulence formula was recorded according to Green and American nomenclature system.

In total, 342, 164 and 367 monopustule isolates of *Puccinia triticina*, *Puccinia striiformis* and *Puccinia graminis*, accordingly, have been analyzed using set of international differential hosts and near isogenic lines, obtained from CIMMYT. The monopustul isolates were isolated from wheat fields from different geographical zones of Georgia.

Results of the virulence surveys showed that the following resistance genes were found to be effective in Georgia against:

Wheat Leaf Rust-Lr9, Lr19, Lr24, Lr28, Lr29, Lr27+31, Lr23+10

Wheat Stripe Rust-Yr1, Yr5, Yr10, Yr12, Yr15, Yr24, Yr26, YrCV, YrSD

Wheat Stem Rust- Sr6, Sr8a, Sr9b, Sr13, Sr22, Sr24, Sr25, Sr26, Sr27, Sr31, Sr32, Sr33, Sr35

Thus, virulence structure of Leaf Rust population is stable and it has not been significantly changed comparing with the previous years. Virulence of Stem rust population has been decreased; virulence structure did not change significantly. A new dangerous race of Stem Rust –Ug99, which infects wheat warieties with gene Sr31, did not registered in Georgia yet. As compared with previous data (Naskidashvili et al., 2001) the virulence of Stripe Rust increased to a marked degree, however, this year the virulence to some lines (Yr9, Yr18, Yr3a) decreased significantly.

IVESTIGATION OF THE MECHANISMS OF TRACHEOMYCOSAL DRYNESS IN THE STONY AN SEEDY FRUITS

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Some defensive reactions of a plant – anatomic-structural, biochemical, and physiological – have been established during penetration into the tissues of the fruity plants of the agents inducing the tracheomycosal dryness – *Verticillium albo-atrum* R. et B., *Phialophora atra* van Beyma and *Cytospora leucostoma* F.R.

In the sites of infection penetration into the seedy (apple, pear) and stony (peach, apricot) plants, development of the new tissues does occur (in the seedy plants – intensely, in the stony plants – weakly), which, later, transform into the timber and we believe that they influence compensation of the damaged timber. In the seedy plants there is no gum-production at the wound site, while in the stony plants the gum-production does occur, which stops following healing. Healing of the wound in the seedy plants occurs within 35-40 days, while in the stony ones in 3-5 months. The cells in the seedy plants are stained brown and in some vessels the thylens are noted, seldom – occlusion with the gum-like substance, while in the stony plants the wood is completely brown, the vessels occluded with the gum-like substance, thylens, and mycelia. Following 150 days, a length of necrosis in the seedy plants makes 12-14 cm, while in the stony ones – 30-32 cm.

The above tracheomycosis-inducing fungi are the toxicogenic fungi and they elicit tissue necrosis. Meanwhile, into the nutrient medium the release pectolytic (pectine-estherase, polygalacturonase) and cellulolytic enzymes, which, act at initial stages of infection, destroy a cell membrane and promote a fungus penetration into the plant. Simultaneously, they stimulate the cells for producing new tissues. Infection occurs in the depth of the wood and then the toxic substances spread by means of transporting vessels.

These fungi, in a case of artificial infection, in the young apple's leave content of the enzymes (catalase, peroxidase, and vitamin C) increases in the red-ox process. Activity of these indices is higher in the seedy plants than in the bony ones.

Different course of the anatomic-structural, biochemical and physiological processes, participating in the drying process, determine relatively high resistance of the seedy plants against the tracheomucotic dryness, as compared to the stony plants.

CHANGEABILITY OF RESISTANCE OF POTATO SORTS TOWARDS MAIN PATHOGENS UNDER INFLUENCE OF CLIMATIC CONDITIONS

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Highly resistant, comparatively resistant and susceptible towards main diseases potato sorts have been revealed. The sorts possessing immunity towards the diseases have not been revealed. Among the earlier introduced potato sorts: Nesterovski, Tatyanovka, Greta are highly resistant towards the main pathogen - *Phytophtora infenstans*. The comparatively resistant are – Lvovyanka and Lorkh. Among the sorts introduced from different countries during the last years the potato sorts possessing immunity towards *Phytophtorosis* have not be revealed. The highly resistant is – Sterling, the comparatively resistant sorts are – Condor, Diamant, Raia and Sante. The latter sort appeared to be the most highly resistant towards *Fusarial* wilt and *Verticilliaceus* wilt. Among the old susceptible sorts towards *Ph. infenstans* we can name – Majestic and Trialeturi, among the new sorts – Kolen and Carolina – particularly in the mountain regions of Georgia. Baltic and Polish sorts appeared to be comparatively resistant towards *Phytophtorosis* but were damaged by virus diseases.

Resistance of potato sorts is changed under the influence of microclimate of the region where they are grown, although the correlation between the sorts is stable. The susceptible towards drying sorts are less damaged in the regional characterized by abundant rains, the sorts susceptible to *Phytophtorosis* – are less damaged in dry regions. In the high mountainous regions of Georgia the development and spread of *Phytophtorosis* reaches 50-90%, while in the dry regions it does not prevail 40-70%.

Proceeded from this it's necessary to foresee the conditions of each plot and degree of the sort resistance during the potato planting.

A REVIEW OF IMPORTANT FOREST DISEASES IN EUROPE AND THE ROLE OF CLIMATE CHANGE AND THE GLOBAL PLANT TRADE

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Current concerns in forest disease involve three main areas: Pine Blights, Phytophthora diseases and Oak Dieback and Decline. The significance of these areas has increased dramatically over the last ten years and they now represent major causes of losses of trees in forests and in amenity trees. The two main pine blights are Sphaeropsis Shoot Blight, caused by *Sphaeropsis (=Diplodia) pinea* and Red Band Needle Blight, caused by *Dothistroma septospora*. The diseases are causing extensive damage to the black pine group, especially to Corsican pine (*Pinus nigra* var *laricio*). Both require similar, specific climatic conditions to maximise their infection potential and so any significant consistent change in climate will encourage high levels of infection. The main damage is the dramatic loss of increment in forest stands but the level of mortality is also becoming a cause for concern. In the UK, the high levels of Red Band Needle Blight have led to a five-year moratorium on the planting of Corsican pine. *Phytophthora* diseases have become a problem not just in Europe but worldwide and new species of pathogenic *Phytophthora* are being discovered every year. The recent discovery of *Phytophthora ramorum* in Europe (and in the USA), and the closely related *P. kernoviae* in the UK, are typical examples. Both species have the potential to cause extensive damage to tree species and, like all *Phytophthora* species, can be widely disseminated by human activity. The huge trade in live plants is the main risk here and both species have clearly been spread through the importation of diseased shrubs. Finally, Oak Decline and Dieback represents a complex syndrome driven by a number of variable factors but with a climatic basis. Oak decline, mostly involving Quercus robur, is widespread throughout Europe but because there are differences in the mix of factors responsible, it has been difficult to study. Of all the problems affecting trees, this one is the most likely to illustrate the effects of climate change and the interactions of various pathogens.

MONITORING OF DISEASES OF INTRODUCED POTATO VARIETIES INTO GEORGIA

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The main goal of the study was to conduct phytopathological experiment on the introduced potato varieties and identify diseases and pest resistant varieties for local condition. A coordinated trial has been conducted at following locations: Aspindza, Akhalkhalaki, Ninotsminda, Tianeti, Dmanisi and Tsalka and following varieties has been studied: Marabeli, Siera, Dezire and Marfona.

Usually most potato diseases are caused by different micro organisms, fungal pathogens, and bacterial and virus pathogens. The main target of our experiment was mainly diseases caused by fungal pathogens: *Rhizoctonia solan, Pectobacterium phitophtorum, Phytophthora infestans, Alternaria solani, Spongospoza subterania, Verticillium albo-atrum, Fuzarium solani.*

From the above mentioned diseases most problematic was Late Blight. Most susceptible variety against the late blight was Marabel and Dezire. There was 100% infection in some potato grooving regions. The variety Siera and Marfona showed good results the rate of the infection was 2.7 % and 3.5 respectively.

VIRULENCE STRUCTURE OF THE GEORGIAN POPULATION *ERYSIPHE GRAMINIS F. SP. HORDEY*

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Powdery mildew caused by the fungus *Blumeria (Erysiphe) graminis f.sp. hordei*, is one of the most important fungal disease of hordey.

Virulence structure of Georgian population was determined in 2005-2007. Samples of Barley Powdery Mildew were collected from nine regions of Georgia. Virulence of 375 SCI was tested on 25 Pallas isogenic lines and 10 varieties European differential set (total 30 resistance genes).

Seedling tests showed that frequency of virulence to genes Ml-a8, Ml-a31, Ml-g+Ml(cp), Ml-h, Ml(Hl), Ml-K1, Ml-p, Ml-r74, Ml-r81, Ml-ra, ML-(Ru-2), Ml-La, Ml-a11, Ml-a10+Ml(Du2) was very high (70-100%). Virulence frequencies on genes: Ml-at, Ml-a3, Ml-a2+Ml (BR2) were distributed moderately (20-35%). Virulence on genes Ml-a9+Mlk, Ml-a9, Ml-a12+Mla+(Em2), Ml-a23, Ml-a6+a14, Ml-a1, Ml(A12) was recorded with low frequencies (0,5-15%). Results of the virulence surveys showed that the following resistance genes were found to be effective in Georgia against Ml-a7, Ml-a7+Mlk, Ml-a7+Ml(Tr3)+Ml(AB), Ml-a13+Ml(Ru3)+Ml(Ru4), Ml-a22, Ml-nn, and Ml-05.

Results of experiments showed that majority of tested lines and varieties were susceptible to analysed isolates. However some resistance genes effective against Powdery mildew of barley were determined. These genes will be used in the breeding program.

CHALLENGES FOR PLANT HEALTH IN THE REPUBLIC OF GEORGIA

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The implementation of laws and regulations providing plant heath border controls and other measures in the Republic of Georgia currently takes place in the unusual context of substantial reorganization of the legal and institutional basis for phytosanitary (and veterinary) border controls that has meant that full phytosanitary controls have been lacking since 2005. This was the consequence of the Joint Decree of the Ministers of Finance and Agriculture of Georgia on border controls for phytosanitary and veterinary border controls implemented in 2006 (currently under amendment) and a decision to postpone the implementation of modernising phytosanitary regulations until 2009. Additionally a new National Service for Veterinary Food Safety and Plant Protection as the National Plant Protection Organisation (NPPO) was created separately from the Ministry of Agriculture which retains responsibility for policy making.

In this transitional period, a number of issues need to be addressed so that the NPPO can function effectively to provide plant health services and meet Georgia's responsibilities under the International Plant Protection Convention (IPPC). These include establishing unambiguous legal authority for the NPPO and other legal measures appropriate to implementation of the IPPC; providing clear lines of delegated authority to other organisations (e.g. Customs) that will ensure that decision-making is based on guidance from appropriate experts; providing infrastructure for pest risk analysis (PRA) which underlines all phytosanitary decision-making; providing a resource-base of trained specialists, diagnostic laboratories and information resources. How these issues are being addressed or could be addressed is discussed in this paper. Special reference is made to the current project supporting the phytosanitary system in Georgia and synergies with other active and concluded projects and with donors.

- *provisional author; full authorship to be decided.*

NEW VIRUS DISEASE OF TOMATOIN FIELD AND GREENHOUSE

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During the monitoring of greenhouse-growing tomato plants in 2005 we revealed swelling, rugosity and wrinkling symptoms on leaves of the Mariachi hybrid. The symptoms distinctly displayed about 30-40% of plants from the beginning of February to summer months. Similar symptoms were also observed in subsequent years – 2006, 2007, and in 2008 they were found on the Macarena hybrid. In leaf extracts of disease plants the virus-like rod-shaped particles, morphologically similar to yellow mosaic virus from the Chinese cabbage leaves, was determined by electron microscopy. The attempts of back transmission the supposed viral infection to healthy tomato plants appeared unsuccessful.

The «boat up to the top» type of leaves wringing symptoms were found in the Solyarosso, F_1 Dutch tomato hybrid. The field-grown plants in Poltava area showed such symptoms from July to the end of September and contained viral particles, morphologically identical to pepino mosaic virus extracted from tomatoes in Netherlands.

Identification of the agents of these diseases is a way to understand the source of virus infection and to control its spreading.

ON FUNGAL DISEASES OF CULTIVATED AND WILD WOODY PLANTS NEW TO GEORGIA

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After brief retrospective analysis of plant fungal diseases situation with special references to the such destructive fungal diseases as mal secco of lemon and other citrus species *(Phoma tracheiphila, formerly quarantine),* citrus scab *(Elsinoe fawsettii),* chestnut blight *(Cryphonectria parasitica),* etc, a number of fungal diseases occurred/recorded in Georgia mainly during last 20 years are briefly reviewed. Among them most remarkable are: powdery mildew of plane trees *(Platanus spp.).* found in August 2002 in street plantings of Tbilisi (East Georgia) and then in Poti and its environs (2005,West Georgia). The fungus, *Microsphaera platani* attacks shoots and leaves causing their deformation and defoliation. From other pathogens causing powdery mildew *(Oidium erysiphoides)* recorded on leaves of pomegranate *(Punica granatum)* in 2004 and following years should be noted though in small (insignificant) amount. It is interesting to note that until now pomegranate is not sited among the host plants of fungi causing powdery mildew.

Stigmina carpophila (Clasterosporium carpophilum), causative agent of shot-hole, fruit spot or peach blight, attacking many cultivated and wild stone fruits species (Rosaceae,subfam. Prunoideae) has been recorded for the first time on Caucasian hackberry *(Celtis caucasica)* and *C. occidentalis* (Ulmaceae incl. Celtidaceae). The fungus attacks leaves, and fruits like cherries, plums, apricots and almonds, leaf spotting is the principal symptom and diseased area drops out resulting in a shot-hole effect. For the time being the diseases on *Celtiis* is observed within Tbilisi Botanic Garden where it was revealed in May 1990.

The theoretical and practical aspects concerning formation of mycobiotic complexes are considered, recognizing that endophytism and latency are of great significant features in life strategies of necrotrophic and biotrophic fungi. These ecological advantages for pathogens existing in seeds or healthy-looking infected organs of native and introduced plants are of great risk for green plantings, forest plantations and agricultural perennials.

BREEDING APPROACHES TO DEVELOP WINTER WHEAT VARIETIES RESISTANT TO STEM RUST UG 99

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The new race of Stem Rust called *Ug 99* was discovered in East Africa (Uganda, Ethiopia, Kenya) in early 2000 and since then it caused devastating effect in the region. Due to easy wind transportation the race reached Yemen in 2004 and Iran in 2007. Testing of the global diversity of cultivated wheat varieties in Keya and Ethiopia demonstrated that on average there is 10-15% of the germplasm is resistant to this new race. *Ug 99* overcame the commonly used genes/sources of Stem Rust resistance which up to now protected the crop from the pathogen for the last 50 years. International Winter Wheat Improvement Program (IWWIP) is a joint venture between Turkey, CIMMYT and ICARDA to develop new winter wheat varieties for the region of Central and West Asia. IWWIP also cooperates closely with the winter wheat breeding programs in Russia, Ukraine, Eastern and Central Europe. IWWIP annually distributes new germplasm to cooperators in the region as well as to winter wheat breeders outside of the region including China, Western Europe, Northern and Southern America. For this reason development of germplasm resistant to *Ug 99* is of prime importance for IWWIP. The current breeding approaches are based on screening of the global diversity of winter wheat in Kenya to identify the sources of resistance. The resistant germplasm is crossed with the commonly grown varieties in the region as well as between themselves to accumulate resistance. The sources of resistance are also screened by molecular markers to identify the resistant genes. The progeny of the crosses and back-crosses originating from *Ug 99* resistant germplasm are advanced to homozygose lines through double haploid or SSD technique and then field tested for agronomic performance. The list of winter wheat Ug 99 resistant germplasm is presented.

TEA ALTERNARIOUS IN GEORGIA

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Wet subtropical zone of Western Georgia is favorable for fungus -*Alternaria alternata* (Fv.) Keiscl. It infects different organs of subtropical, technical and walnut plants. The fungus *Alternaria alternata* infects tea leaves, shoots, flowers and boxes. It appears of tea leaves, mainly, in summer and then we fix it during the whole summer, then during the whole year - on the middle-aged leaves. The disease is of dark-brown, different size and form of spots. In rainy conditions the spot is covered with blackish velvet fleck that is the fungus conidia. The lesions on the tea flowers are of brownish color, and then covered with velvet flecks. In accordance with the literature the fungus *Alternaria alternate* infects 70% tea leaves and shoots in India and Northern Bengal. In 2004-2006, according to our researches tea leaves infection varies between 10-15%, its intensity - 5-6% in different zones of tea plantations. Tea shoots disease is fixed, mainly, in May-June and reaches 8-12%, intensity - 6-8%. The fungus is very easily isolated into pure culture. It develops very well at 23-25^{0}C. The colony is grey color; high velvety with hills. Eight-day colony covers the whole Petri dish. Sporulation is very high. Substrate mycelium is of dark lilac color. Conidias are egg-shaped, 5-10 celled with vertical or horizontal septa. size - 31-58x18-24μm; conidias - short, straight, brownish; size - 50-75 x 6-9 μm.

The fungus *Alternaria alternata* infects the upper young leaves very rare, but it reduces the yielding very much.

MONITORING OF BARLEY YELLOW DWARF VIRUS AND OTHER CEREAL VIRUSES IN RUSSIA

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Barley yellow dwarf (BYD) disease caused by BYDV (*Barley yellow dwarf virus*) and CYDV (*Cereal yellow dwarf virus*) has been known in Russia since the early 1960s. Between 1988 and 1991 epidemic of BYD disease on small grains was observed in Russia and other European countries. BYDV has been studied in Russian Research Institute of Phytopathology since 1991. Between 2001 and 2004 incidences of BYDV and CYDV in all grain-growing regions of Russia were investigated as a part of the project funded by ISTC. Cereal samples were collected during expeditions to the regions. Regional Stations for Plant Protection participated in samples collection as well. BYDV and CYDV strains were detected by ELISE, using commercial polyclonal and monoclonal antibodies produced by ours in collaboration with T.N. Erokhina from Institute of Bioorganic Chemistry RAN. There was confirmed that all 5 known strains of BYDV and CYDV (MAV, PAV, RMV, SGV and RPV) are presented in 38 provinces and Territories of North-Western, Central, Central-Chernozem, Volga-river regions and the Northern Caucasus of European Russia. For the first time, BYDV incidences were observed in Asiatic Russia (in whole, in 16 territories of the Urals, Western and Eastern Siberia and the Far East). Availability and proportion of each BYDVs and RPV-CYDV in summary infection depended on species of aphid fauna, numbers of viruliferous aphids, presence of infection loci and other conditions. In addition to BYDV and CYDV, the other cereal viruses were found in inspected Russian regions, namely, *Wheat streak mosaic virus* (WSMV), *Barley stripe mosaic virus* (BSMV), *Brome mosaic virus* (BMV). *Northern cereal mosaic virus* (NCMV) was identified in Western and Eastern Siberia and *Out pseudorosette virus* (OPV) was detected in Eastern Siberia.

DETERMINATION OF PHYTOPLASMAS INDUCING FRUIT TREES AND LEGUME DISEASES IN AZERBAIJAN

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Phytoplasmas are responsible for plant diseases damaging annual crop as well as perennial cultures such as fruit trees and grapevine. These pathogens multiply within the phloem cells of the host plant and are transmitted from plant to plant by phloem-feeding insects and by vegetative multiplication of infected plant material. As of today, the many diseases induced by phytoplasmas cannot be cured and the control of disease spread consist of implementing prophylactic measures, such as quarantine, destruction of infected plant material and pesticide treatment against the insect vectors. Implementing phytoplasma-induced diseases control requires the taxonomic characterization of the agent, the determination of its plant host range and the identification of its insect vectors. Prophylaxis necessitates the development of methods for diagnosis which are relying on the molecular detection of phytoplasma DNA in plants and insect vectors as phytoplasma cannot be cultivated in vitro. Different fruit trees and showing yellowing symptoms reminiscent of phytoplasma infection were collected in September 2007 in Guba region of Azerbaijan and was prepared plant nucleic acid extracts.

The samples were tested by 16S-rDNA nested PCR with the universal primers for phytoplasmas R16mF2 / R16mR1 and R16F2n / R16R2. For every plant was tested the DNA extract of diseased plants and the DNA extract of healthy plants as control. Results showed that a pepper, an eggplant, the pear tree and the peach tree were positive for phytoplasma infection.

For taxonomic characterization of phytoplasmas were used two technologies: 1) RFLP analysis and 2) the sequencing of the PCR products. Results acquired from RFLP analyses with enzyme AluI and RsaI showed that the 16S-rDNA from the infected pepper (pv), eggplant (au3) and cherry tree (AZ3, sample collected in 2003 during a survey in Azerbaijan) gave the same profile that the Stolbur phytoplasma reference strain (Molière) maintained at INRA Bordeaux in periwinkle *Catharanthus roseus*. The 16S PCR product detected in the pear tree gave the same profile as Pear Decline phytoplasma (*Candidatus* Phytoplasma pyri), and the peach tree gave a profile different from all controls analyzed. These results were confirmed by the analysis of the PCR product sequences.

The infection of annual crop like eggplant and peppers confirm that this phytoplasme is present in Azerbaijan and that it is locally transmitted by insect vector (the only way to infect annual crop obtained by seedlings).

In conclusion, we performed the first detection of the stolbur phytoplasma in Azerbaijan on annual culture and confirmed the presence of *Candidatus* Phytoplasma pyri (genetic characterization of 2 different strains). Finally, was detected for the first time of a new phytoplasma for peach tree (*Candidatus* Phytoplasma brasiliense).

GOOD CAUSES AND BETTER EFFECTS: THE WORK OF THEGLOBAL PLANT CLINIC IN COORDINATING PLANT DISEASE DIAGNOSTIC SERVICES AND PLANT DISEASE MANAGEMENT

BOA ERIC

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The Global Plant Clinic (GPC) is managed by CABI in alliance with Rothamsted Research and the Central Science Laboratory and is a ‘plant health service provider’. We use this description to emphasise our cross-cutting work in research and extension and the practical benefits to farmers. Although science is a key part of the GPC, our targets are set by the international donors and not by the scientific research community. Donors are most concerned about social and economic needs. Better agriculture and more successful crop production are two key ways of reducing poverty and increasing prosperity.

Improvements in plant health services demand more than capacity building. One the GPC's key roles is to improve coordination of research and extension efforts and we have adopted a concept of plant health services and plant healthcare along similar lines to that used in human health. A key innovation has been the use of grassroots organisations (e.g. non-governmental organisations, farmer groups and cooperatives) to establish plant health clinics. These have proved to be a highly efficient and inexpensive means for gathering farmer demand, identifying practical solutions and improving vigilance. The clinics increase access to diagnostic laboratories, encourage better support from extension workers and strengthen links to scientists who develop and test pest and disease control measures.

Since 2003, GPC has helped to establish 80 independent and regularly run plant health clinics in nine countries in Latin America, Asia and Africa. Thousands of farmers now have access to regular and reliable plant health services, including better access to diagnostic laboratories. The GPC has confirmed and helped publish 31 new disease records from 17 countries. I will discuss the relevance of these findings, and plant health clinics and the concept of plant healthcare in the context of Transcaucasian countries and how new ideas may help to solve old problems.

SEED HEALTH THROUGH THE DIAGNOSIS OF DISEASE

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Most arable crops worldwide are grown from the annual planting of seed. Much of this has the potential to carry plant disease caused by bacteria, fungi, viruses and nematodes. The consequence of harbouring such pathogens can cause direct effects like preventing germination and reducing crop yield and quality. They can also cause major indirect cost, such as the loss of crop sales and the introduction of massive monitoring costs for the pathogen. For example it has been estimated that if the fungal quarantine pathogen *Tilletia indica* was introduced into the UK over an area of 50,000 ha then this would cause at least €13.47 million of loss revenue in year one (Sansford *et al*, 2006).
To reduce seedborne disease many methods have been developed, ranging from inspecting seed crops for disease to performing rigorous laboratory tests on marketable seed. Many of these methods are well documented and validated and easily available through organisations such as those produced by the International Seed Testing Association. Their uptake however often depends on the skills and facilities available within test laboratories. This paper describes a range of test methods available from using classical techniques of microbiology to more modern methods utilising molecular techniques. It also highlights several international resources that are available to help reduce the spread of disease worldwide.

MONITORING OF PRIMARY STRUCTURE OF RUSSIAN ISOLATES OF POTATO SPINDLE TUBER VIROID

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The collection of *Potato spindle tuber viroid* (PSTVd) of Russian Research Institute of Phytopathology (VNIIF) was instigated in the early 1990s after widespread distribution of this pathogen was found on many Russian farms. Since that time, the collection has been maintained by annually reproducing potato tubers infected with PSTVd in field. The collection was considerably supplemented by new PSTVd isolates in 2006 and 2007. Between 2006 and 2008, sequence analysis of 40 Russian PSTVd isolates was performed thanks to USDA/ARS funding. All Russian PSTVd isolates sequenced to date were compared with the PSTVd-Intermediate type strain (GenBank V01465). Russian isolates exhibit a deletion of adenine 123 that is also characteristic for about 40% other naturally occurring PSTVd isolates included in GenBank database. Twenty two Russian PSTVd isolates showed an A→U substitution at position 120 that was also characteristic of 23% other natural PSTVds from database. Eighteen Russian PSTVd isolates exhibit A→C substitution at position 120 that was characteristic exclusively for Russian PSTVds. Except the latter change, 193 C→U, 256 C→U and 306 U→A characterize, perhaps, endemic Russian PSTVd isolates. Thus, 23 PSTVd isolates sequenced are identified as endemic.

Twelve Russian isolates were identical to a previously described isolate from Germany; i.e., PSTVd004, GenBank V14814, and one isolate was identical to PSTVd009, GenBank M88677, USA. Sequenced PSTVd isolates were originated from different Russian regions such as Central, Northwestern, Volga-river, the Northern Caucasus and the Far East. Isolates from Northwestern region were the most variable in sequence. The most common changes were i) deletion of residue 219A and ii) insertion of one or more G residues in the lower portions of the variable, central, and pathogenicity domains.

VIRAL INFECTIONS ON CULTURAL PLANTATIONS OF MEDICINAL PLANTS (*PLANTAGO MAJOR* L., *VALERIANA OFFICINALIS* L., *PANAX GINSENG* C. A. MAYER) IN UKRAINE

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Recently viral infections are big problem in production growing of cultural plants. For today there is no infirmation about viruses' infected medicinal plants in Ukraine. That's why the aim of our work was indication of the most widespread viruses of medicinal plants and studing of their biological properties. As a result *Panax ginseng* C.A.Meyer, *Valeriana officinalis* L., *Plantago major* L. plants with symptoms of viral infection is revealed. Viral nature of disease was proved with biotesting method. The flexious virions 1200×11nm, 2360×18nm, 525×11 nm and rod-shaped - 320×17 nm and 95×15 nm in ginseng plants were detected with electron microscopy method. In plantain plants rod-shaped particles 270×15 nm and in valerian plants flexious viruses 530×11 nm is found. Rabbit polyclonal antiserum was get to virus, detected in valerian leaves. Our investigation is showed that viral infection reduces quality of pharmaceutical material.

DEVELOPMENT OF NATIONAL CULTURE COLLECTION OF PLANT PATHOGENS

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The Culture Collection has been created in 2005 for registration and conservation of biodiversity of pathogens of main agricultural crops. Nowadays a Collection is presented by 65 species and includes more then 500 strains of pathogens from 17 host-plants. The Collection is constantly replenished. The complete information about all the species in the Collection is accumulated constantly. This information is important for controlling of potentially dangerous pathogenes as biological weapons.

The culture from our Collection, namely *Septoria nodorum, Septoria tritici, Pyrenophora tritit*ci-*repentis, Puccinia triticina, Puccinia graminis, Puccinia striiformis* are used in National and International Breeding Programs.

MONITORING AND DIAGNOSTICS OF THE VIRUS DISEASES OF WINTER WHEAT UNDER THE CONDITIONS OF THE CHANGING ABIOTIC FACTORS IN UKRAINE

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In recent years increasingly more frequently the anthocyanin coloring symptoms of winter wheat flag leaves are observed. They appear in the beginning phase of earing under a sharp temperature fall (about 20°C). The most plants with such symptoms were shown to be virus-free but some of them contained rod-shaped and/or filamentous virus-like particles including wheat striped mosaic virus.
Our investigations have shown that the physiological reason for the appearance of red painting of winter wheat flag leaves is the increasing synthesis of anthocyan and sugars as a result of temperature stress and virus infections. Very frequently the disease symptoms can be caused not by virus, but by the influence of temperature. At the same time the temperature decrease can favorably affect the virus infection and create the anthocyanin painting, characteristic for barley yellow dwarf virus. Therefore for the establishment of the reliable reason for the periodic appearance of the anthocyanin coloring symptoms it is necessary to conduct monitoring studies with the use of contemporary methods for virus diagnostics.

A REVIEW OF DIAGNOSTIC METHODS - OLD AND NEW

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Diagnostic methods include those for detection of pathogens in plant tissues and methods for isolating and identifying pure cultures. Molecular methods have transformed both in recent years. However the value of the more traditional methods must not be overlooked. There is enormous diagnostic value in the symptoms seen, the isolation plates and a properly conducted host test. This information often needs only minimal additional information to enable highly accurate presumptive and confirmatory diagnosis. There is no doubt that modern methods, especially molecular methods, facilitate accurate differentiation of closely related pathogens. Increasingly, gene sequencing is becoming a cost effective method for identification of species with genetic fingerprints enabling infraspecific differentiation.

For *in situ* detection, PCR based assays are becoming more robust and there are many methods that have now been validated against the more traditional methods. Extraction of DNA from plant tissues is often a key issue. Microarrays comprising panels of pathogens have the potential for use in identifying pure cultures and possible even detection of pathogens in diseased tissues. Field based diagnostics offer very rapid diagnosis at the point needed eg in inspection. Lateral flow devises based on antibodies, portable real time PCR and electronic noses all have potential here. The advantages and disadvantages of these methods will be discussed.

STUDYING OF RESISTANCE OF LOCAL WINTER WHEAT VARIETIES TO FUNGAL DISEASES

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Global consumption of wheat constantly grows and during nearest 20 years is expected 40 % gain, which in 2020 will reach 840 million tones. For maintenance of food security of the increasing population of the earth creation and introduction in manufacture of new high-yielding varieties, tolerant to abiotic and resistant to biotic stresses was and remains the mainest problem facing to breeders and manufacturers of wheat.

Task of our researches was studying and improvement of local bread and durum wheat varieties on resistant to fungal diseases which are spread in all regions of wheat cultivation. Rust diseases of cereals are one of the main reasons of a shortage of many grain crops yield. Within epiphytoty of rust diseases reduce productivity up to 30 % and more. Hurmful of rusts consists in reduction of assimilation activity of plants, infringement of physiological processes, deterioration of winter hardiness of winter crops, inability to formation in grain low molecular weight qluten components suppression of processes of synthesis and adjournment of starch, and also protein in embryo.

The most effective way of diseases control of wheat is creation and introduction in manufacture of new resistant to pathogens wheat varieties. Work on selection of resistant varieties difficult and continuous process as adaptive opportunities of phytopathogens are boundless. With the purpose of creation of resistant varieties for several years on Apsheron experimental base of ARIA were studied winter bread and durum wheat samples on resistance to the basic diseases yellow, leaf rust and powdery mildew. Researches were carried out in field in natural conditions. Varieties of the Azerbaijan breading earlier not affected or moderately affected, in 2004-2005 have been affected with yellow rust considerably. That has lowered yield and quality of a grain. Probably it has taken place because of appearance of new races of a fungus as a result of fast increase in quantity of rust under optimum weather conditions for its development. In the given year a resistance to diseases were: yellow rust - 25,0 %, moderate resistant – 50,0 %, susceptible – 25,0 % at tested durum wheat; resistant – 42,9 %, moderate resistant – 7,14 %, susceptible – 50,0 % at bread wheat. Yellow rust among rust diseases negatively influencing on productivity of a winter wheat infects all elevated parts of plant, reduces energy of photosynthesis therefore in spike formed less grains or they become shriveled. Among the investigated varieties resistant to leaf rust durum wheat varieties had 75, 0 %, moderate resistant 12, 5 % and susceptible 12, 5 %, bread wheat varieties 57, 1 % resistant, moderate susceptible 14, 3 %, susceptible 28, 5 %. The majority of tested bread (67, 0 %) and durum (85, 0 %) wheat varieties in lower degrees (I-II) were affected with powdery mildew. In 2005-2006 12,5 % of tested durum wheat varieties appeared moderate susceptible and the others resistant and 64,3 % of bread wheat appeared resistant 7,14 % of moderate resistant, 7,14 % of moderate susceptible and 21,4 % susceptible to yellow rust. To leaf rust there was resistant all tested varieties of bread and durum wheat. Powdery mildew changed in interval I-II at durum and II-V at bread wheat.

2006-2007 appeared favorable for varieties of local breeding as susceptibility to infection of fungal diseases was lower in comparison with other vegetative years. From the investigated varieties of local breeding in a complex resistance to the basic deseases in Apsheron conditions within researches appeared durum wheat Garagilchig 2, Vugar, Barakatly 95, Shiraslan 23 and bread wheat varieties Azamatly 95, Qobustan, Nurlu 99. The selected varieties will be used at breeding and hybridization for creation of varieties resistant to diseases.

EVALUATION OF WHEAT BREEDING MATERIAL ON RESISTANCE TO FUNGAL DISEASE IN SUPPLY RAIFED CONDITION.

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In Azerbaijan, in the same way as in the other country grain-growing is a primary task of the agriculture. Grain of the wheat – an important material for processing industry.

The baking quality of bread directly depends on quality of grain. The reduction of quality of bread is a big problem of contemporaneity. One of the main factors influencing on quality of bread are disease and pests.

For the last 10-15 years in Azerbaijan broadly spread the diseases of the yellow rust and smut that negatively affect quality and productivities of the wheat.

The studies conducted on rainfed condition have shown that, at the last two years ecological conditions have brought about depression of the yellow rust this disease regressed, but at the same time such disease as septorioz, helmintosporium, fuzarium and other root rotted got the so-called new push in spreading.

The observations conducted in Sheki BES of the institute of Agriculture Is revealed the following interesting facts: for the last 2 years disease of the rust were absent, powdery mildew was within 1-4 ball, fuzarium, helmintosporium within 2-4, ball but septorium in contrast with others was a limit 4-8 ball.

The observations were conducted in 10 samples of competitive and in 18 samples of the checking nursery.

When undertaking the artificial infection 14 samples, the smut, was as a result 4, resistant varieties Leukomelan 1, Lyutessens 12, Lutessens 30, Greakum 15 were selected.

On indications of grain qualities of these samples were determined deterioration of the factors of sedmentation and qleeten. Vtreousnes of these samples were very low and grain was mealy.

SELECTION OF RESISTANT TO DISEASES VARIETY SAMPLES OF WHEAT FROM INTERNATIONAL NURSERIES FOR CONDITIONS OF AZERBAIJAN.

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For needs of food consumption of the growing world population are necessary new productive, steady new productive, resistant to diseases and pests drought and cold-resistant varieties of wheat. On information of FAO 40 % of the world population starve and dies from hunger 20 mln population in every year. Because of this, we should correctly and economically use chemicals for pest and diseases control in grain crops.

Last 10 years in Azerbaijan grain crops wide spread in particular yellow, leaf rust, powdery mildew, etc. diseases. The physiological, biochemical and genetic researches which have been carried out in this direction, have allowed academician J. A. Aliyev to create "ideal" model of wheat for which the task was creation of resistant to biotic and abiotic stress factors varieties by expansion of research and studying of physiological features of wheat in field conditions. Soil - climatic conditions of republic allow, by studying a world genofund of wheat in different regions, to provide selection of corresponding forms. These forms after carrying out of selection are used not only in hybridization with local varieties, but also enable to

enrich a genofund of grain crops. At repeated studying of nurseries are selected more than hundred early ripening variety samples of wheat which avoid characteristic for republic spring - summer drought and distinguished by resistance to diseases. For achievement of objects are

carried out phenological and phytopathological observations, determined height of plant, productivity and structural elements of spike, etc. biological parameters.

Experiments were carried out in field conditions on experimental base of the Azerbaijan Research Institute of Agriculture, located on Apsheren. Further the selected samples are included to ecological test in various contrast soil - climatic regions of republic.

Basically these samples concerned to the different international nurseries. As a result of the carried out ecological tests in various regions of republic it is revealed, that the allocated samples from nurseries and which reclived from CIMMYT and ICARDA were facultative and winter type and located in groups with early (on April, 7-10) and midle (on April, 15-22) heading, and productivity and weight of 1000 grains varied, accordingly within the limits of 120-924 q/м2 and 31,2 - 60,0 q. Samples

from nursery HTWYT, ESWYT and EDUYT basically showed moderate susceptible (10-30 MS) reaction to yellow rust. Allocated perspective variety samples of bread and durum wheat concerning to nurseries RBWYT, WON-IRR and EDUYT prepared on joint programs of CIMMYT and ICARDA and, primary ecological tests are carried out in Turkey, more comprehensible for local weather conditions. The samples revealed from these nurseries, basically, were winter, facultative type, wintering was high and are placed in groups resistant to rust diseases, with mid (April, 22 May,-02) heading dwartish, productivity changed within the limits of 780-924 q/м^2.

Thus the international nurseries prepared on joint programs of CIMMYT and ICARDA for creation of new valuable, perspective and having wide ecological plasticity wheat varieties for different soil – climatic conditions of Azerbaijan are important.

STUDY OF *CONIOTHYRIUM MINITANS* MYCOPARASITISM TOWARDS *SCLEROTINIA SCLEROTIORUM* USING GFP AND DSRED MARKER GENES

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Sclerotinia sclerotiorum (Lib) de Bary is a plant pathogenic fungus that causes important diseases known as white mold, causing severe economic losses on a large range of crops including vegetables, beans, soybean, sunflower, tobacco and rapeseed.

Fungus *Coniothyrium minitans* Campbell is an aerobic mycoparasite capable of attacking the fungal plant pathogen *Sclerotina sclerotiorum* resulting in the degradation of sclerotia and hyphae of the pathogen.

C. minitans was transformed via *Agrobacterium tumefaciens* – mediated transformation with the genes encoding DsRed and GFP using binary vectors pCAMDsRed and pCAMBgfp for visual demonstration of distribution mycoparasite inside the sclerotia.

By *C. minitans* DsRed and GFP transformants were inoculated sclerotia of *S. sclerotiorum*. GFP and DsRed transformation enables to use a fluorescent microscope for tracing the growth of labelled *C. minitans* strains inside host structures: germination of conidia, penetration of fungus in the cortex of sclerotia, intracellular growth of mycoparasite inside the host and formation of pycnidia under the rind and in the medulla of plant pathogenic fungus.

CONTROL OF THE MAIN FUNGOUS DISEASES OF GRAPEVINE BY APPLYING NEW FUNGICIDES

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At present, spread on grapevine in Georgia is the following main diseases: oidium, mildew and gray rot of grapevine. In the course of a number of years, against these diseases we tested fungicides of various chemical groups.

Simultaneous control of a complex of diseases has lately become the issue of the day. Synthesized on a world scale are fungicides each of which can be used for controlling several diseases. Such preparations are Zato and Quadris. Zato (registrant “Bayer Kropsaen”) belongs to the class of oxyminoacetates and Quadris (registrant “Agro”) to that of strobilurines; the active substance of the former is triphloxistrobin and that of the latter nitroxystrobin.

The above preparations were tested by us against mildew and oidium in vineyards in Kakheti (Dedoplistskaro) from 2005 to 2007.

The preparation-testing scheme was as follows: I treatment was carried out before blossoming, II one – after blossoming, and the next three treatments – at 12-14-day intervals. The records showed that the biological effectiveness of Zato and that of Quadris against mildew and oidium were 90 – 95% and 89 – 96%, respectively.

The application of either of the two preparations, Zato or Quadris, ensures simultaneous control of the diseases mildew and oidium, which makes it possible to reduce chemical treatments and is of great importance from the viewpoint of both economy and ecology.

BACTERIAL PROTEINS – INDUCERS OF PLANT RESISTANCE TO FUNGAL, BACTERIAL AND VIRAL PATHOGENS

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Screening of various microorganisms for the ability to induce defensive reactions in plants resulted in the finding of MF-proteins that were isolated and characterized as inductors a broad-spectrum resistance to different plant pathogens and thus constituted an alternative approach to crop protection from these pathogens. These proteins when used as pesticides increased resistance of potato plants against viral, bacterial and fungal pathogens, wheat and cabbage plants against fungi, tobacco plants against viral and fungal pathogens. Increase in resistance was substantial and the proteins are effective in very small amounts. After determination of *mf-* genes structure it was revealed, that elicitor MF2 isolated from *Bacillus thuringiensis* belonged to cold shock proteins (CspD) family and MF3, isolated from *Pseudomonas fluorescens,* was shown to possess high level of homology with peptidyl-prolyl cis-trans isomerases (PPIases) of FKBP-type. It was shown that MF-proteins had no phytotoxic effect on plants. Active parts of these proteins responsible for inducer functions were determined.

ISOLATION AND CHARACTERIZATION OF *AGROBACTERIUM SPP.* – SPESIFIC BACTERIOPHAGES

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*Agrobacterium sp***.** is a pathogenic bacterium responsible for the appearance of tumorous overgrowths and roots for crown gall in different plants. Among commonly infected plants, grapevine is of major commercial importance. Biocontrol agents like bacteriophages, capable of controlling or eliminating pathogenic *Agrobacterium* sp., are much thought after.

22 bacterial strains were used for bacteriophage isolation, including standard strains of *A. vitis* (AB-3, AT-1, Tm-4, S-4**)**, *A. tumefaciens* (strain C-58) and *A. radiobacter* K-84, also *A. tumerfaciens Sh-1* and 14 strains of presumptive Agrobacterium *sp.*, isolated in Georgia. Up to 45 water samples from Black Sea coastal zone, as well as from rivers and lakes, field channels in different parts of Georgia were used as a source for phage isolation. All samples were enriched by A. *vitis* and other *Agrobacterium* strains separately and incubated at 22ºC and 30ºC for 12, 24, 48 and 72 h according to standard protocols (T. Chanishvili, 1969; Gabrilovich, 1973).

To exclude the presence of temperate phages in the bacterial cultures used in the enrichment assays, spontaneous lyses and UV induction of the cultures were performed. No lytic activity was observed using six indicator standard strains. Enrichment of environmental samples resulted in obtaining 11 primary phage isolates from rivers Mtkvari and Digmula, Alasani irrigation channel (East Georgia), and Supsa estuary (West Georgia). During the subsequent processing, cloning and concentrating 6 phage lysates - natural mixtures with the stable lytic activity were selected: AgF7, AgF12, AgF9, AgFD1, AgFSh-1, and AgF11. For each of these phage isolates, after series of passages one to three phage pure clones were obtained characterized by different type and size of negative plaques. Significant diversity in phage nucleocapsode morphology was revelaed demonstrating presence of representatives Myoviridae, Podoviridae and Siphoviridae families among isolated phages. In total, up to 20 phage lines which expressed lytic activity towards various *Agrobacterium* test-strains (A.vitis and *A.tumerfacierns*) *were* isolated. Several groups of *Agrobacterium sp.* –specific phage clones were identified based on host range, virion morphology and phage genome size. No strong specificity to *A.vitis* was observed that indicates necessity of additional adaptation series to enhance species-specificity of the phage clones.

MATERIALS FOR THE STUDY OF FACTORS REGULATING NUMBER OF CARRIER OF PHYTHOPLASMA AND VIRUS DISEASES OF MULBERRY AND CITRUS IN GEORGIA

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In the spreading phythoplasma and virus diseases the important role carries out the Carrier. From this point of view we must mention about *Mulberry phythoplasma* and *citrus virus diseases*. Phythoplasma disease curly leaves of mulberry are carried by *Hishimonus sellatus* uhler. Citrus virus disease are carried by tristesa carrier *Toxoptera aurant*i B. de F., *Aphis spiraecola* Patch; *Ricania japonica* Mell. Above mentioned diseases reduce productivity, deteriorate quality and often cause a death of plant.

The main aim of this investigation was reveal of above mentioned carrier's number regulating fungi and determination their pathogenity to carrier. For detection the fungi from carriers was used standard method (Evlakhova, 1973; Abbot, 1925). On the *Hishimonus sellatus* Uhler was revealed eleven species of fungi. It was established pathogenity of six species of fungi (*Cephalosporium roseo griseum*, *Trichothecium roseum* Link: Fries, *Cladosporium potebniae* Pidopl. et Deniak, *Penicillium madriti* Smith Nees, *Mycor miehei* Gooney et Emarson, *Micelia sterilia*) in respect to mulberry leafhopper *Hishimonus sellatus* uhler of different ages. On the carriers of tristeza – aphides was revealed three species of fungi and on the *Hishimonus sellatus* uhler – eight species of fungi. It was established pathogenity of three species of fungi (*Trichotecium roseum* Link: Fries, *Fusarium lateritium* Ness, *Cladosporium potebniae* pidop: Deniak) in respect to *Ricania japonica* Mell.

USING SOMACLONAL VARIATION IN PLANT SELECTION FOR RESISTANCE TO TOMATO SPOTTED WILT VIRUS

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Tomato spotted wilt virus (TSWV) characterized by high genetic variability and worldwide distribution, is transmitted by mechanical inoculation, grafting and eight thrips species, has an extremely broad host range, and causes essential economic losses in many important crops. Considering successful using of somaclonal variation in selection of disease-resistant plants the resistance of tobacco somaclones to tomato spotted wilt virus was investigated.

Our investigations show that TSWV-resistant somaclones can be produced by regeneration of plants from leaf- or protoplast-derived callus; by hybridization of selected virus-resistant somaclones of susceptible tobacco varieties with resistant wild species; by intercrossing between semifertile somaclones of interspecific hybrids as well as by producing of plants from nongermitable seed *in vitro*.

So, somaclonal variation may be used as a source of TSWV-resistance, as well as a way to overcome the crossability barriers between tobacco cultivars and TSWV-resistant *Nicotiana* species and to increase the fertility of resistant hybrids.

RESISTANCE OF WINTER WHEAT SAMPLESTO YELLOW AND LEAF RUSTS IN CONDITIONS OF AZERBAIJAN

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In creation of new varieties, initial material has the great importance. At study of a collection samples the majority of the researchers in their papers note importance of initial material in creation of new varieties. In conditions of Azerbaijan the basic fungal diseases of bred and durum wheat are yellow (*Puccinia striformis*) and leaf rust (*Puccinia recondita)*.

Usually first are infected the lives of the bottom part and gradual passing to upper leaves therefore the normal development and growth of plants broke down, that results to decrease of yield. In control of these diseases one of basic way is the creation of new resistant to these diseases varieties. For revealing of resistant samples of winter wheat in irrigated conditions the researches were carried out in Apsheron EBS at Azerbaijan RI of Agriculture.

In 2004-2006 years more than 1200 samples of a different origin were investigated. Many samples from these materials were mid heighten and dwarfish. By results of the carried out researches we were qruped samples of drum and bread wheat on infection by yellow and leaf rust.

In 2004 from 247 samples of bread wheat 7,3 % were affected by yellow rust, and 79,8 % were moderate and highly resistant. Infection by the leaf rust marked at 22,3 % of samples, moderate and highly resistant were - 46.9 %. Among 206 samples of durum wheat 24,2 % were affected, by yellow 11,6 % by leaf rust, and 68,5 % were resistant to yellow, and 72,7 % to leaf rust.

In 2005 researched 176 samples of bread wheat13,6 % were affected by yellow, 11,9 % by leaf rust, and accordingly resistant and moderate resistant were 68,8 to yellow and 75,0 to leaf rust. From 154 samples of durum wheat at 1,9 % was marked weak affection by yellow, 0,6 %-leaf rust, and the resistance were accordingly 98,1 of % to yellow and 92,3 % to leaf rust.

In 2006 from 296 samples of bread wheat 9,1 % were affected by yellow and 11,8 % by leaf rust. From the investigated samples were resistant 76,7 % to yellow and 78,7 % to leaf rust. From 49 samples of durum wheat the infection by yellow rust was not found out, by leaf rust was 6,1 % and 100 % of samples were resistant to yellow, 87,7 % resistant to leaf rust.

Thus, in 2004 varieties with a foreign origin in Jeneva, ZH ONG-68 (Turkey); Khnelsky-900, in a strong degree were affected by yellow and leaf rust and were the sources of infection for local varieties Taraqqi, Mirbashir-128, Murov (Azerbaijan).

In 2005 from bread wheat samples by yellow and leaf rust affected varieties with foreign origin Canada - 1, Canada - 2 (Canada), Umanka (Russia), Weels (USA), and local varieties Taraqqi, Shafaq, Mirbashir-128.

In 2006 bread wheat samples with foreign origin affected by yellow rust were Canada - 2 (Canada), Weels (USA), Bezoztaya-1 (Russia). In 2006 the durum wheat samples were not affected by yellow and leaf rust. During researches among local and introduced samples are revealed resistant.

Thus by results of researches are revealed resistant to yellow and leaf rust local also introduced samples of bread and durum wheat. New resistant samples will be used in breeding as the parental forms at crossing for creation of new varieties.

INFLUENCE OF DISEASE INFECTION DEGREE ON PHOTOSYNTHESIS INTENSITY OF WHEAT

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At present for reception of high yield in agricultural crops except using of technological practice, creation of resistant to stress factors varieties has great importance. One of the main stress factors affected cereal crops is yellow rust.

Depending on degree of infection and morphophysiological features of varieties yield loss of the crop affected by this disease sometimes reach up to15-20%. The diseases Influence depends on many factor, including of physiological features of plant and increasing conditions. As a result of diseases influences, disordered the morphophysiological features of plant, increased of respiration intensity and decreased the yield.

In many researches is showed that under influence of the diseases decreased assimilation area of leaves and productivity of plants. As a result of diseases decreased the photosynthesis pigment content, particularly chlorophyll contents.

On this specified question the study were conducted on Apsheron experimental base station. For the experiments we were chose the different genotypes on degree of disease infection.

1) Akinchi 84 - susceptible to yellow rust; 2) Giymatly 2/17- moderate susceptible to yellow rust; 3) Girmizi gul1- resistant to yellow, susceptible to yellow rust; 4) Azamatly 95- resistant to disease.

The photosynthesis features of plants were measured regularly at heading and early waxy ripening stages. The Experiments were carried out in two variants: 1 – in natural condition; 2 – variant with using the chemicals. For disease control was conducted spraying with 25% Tilt.

Thereby, at heading stage on susceptible varieties is discovered affecting the plants by yellow rust. In this stage amount of assimilated CO2 was 9-14%, in flowering 22-28%, in grain formation 31-39%, in milk ripeness stage 43-45%. At the end of vegetation in connection with increasing of the temperature is observed delay of development of the yellow rust. On susceptible to leaf rust variety Girmizi gul 1 is discovered infection and sharp difference on the photosynthesis futures. The degree of infection reduces the productivity on 5-15%. Thereby is realized that yellow rust more influences on productivity, than leaf rust and this occurs because of activity of disease for a long period. The disease influence on reduction of morphophysiological features of the plants at the end decrease the yield.

THE INFLUENCE OF GAMMA-IRRADIATION ON THE IMMUNE ABILITY OF PLANT TISSUES

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Presently the concept about immunity of plants as of united biosystem has been quite precisely formulated. From this point of view investigation of the factors capable to modify the level of immunity especially of such strong factors as radiation represents actual scientific task. As a model for investigation the irradiated tissues of potato tubers artificially infected by microorganisms different by their pathogenity - *Fusarium solani* and *Verticillium lateritium* were used by us. The analysis of the development of tissue necrosis showed that together with the increase of irradiation dose till 100Gy there was an increase in the intensity of development of necrosis caused by the influence of *Fusarium solani* which is virulent for potato tissues, whereas in case of *Verticillium lateritium* characterized by low virulence the mentioned effect was not seen. Besides, simultaneous influence of *Fusarium solani* and *Verticillium lateritium* caused unsignificant increase of necrosition in comparison with application of alone *Fusarium solani*. On the basis of conducted investigation the conclusion was made about the influence of Gamma-radiation on the condition of immune system of potato tubers. If taking into consideration that at exposure to radiation the primary radiation events is conducting practically at every molecular structure, then it is possible to speak about gamma-radiation as an universal damaging factor without specific characteristics in case of any other physical-chemical influences. The mentioned effect is offered to be applied at phytopathological investigations where the necessity of modification of immune response against the influence of different microorganisms takes place.

EFFECT OF THE GREEN TEA EXTRACT AGAINST PATHOGENIC FUNGI *DRECHSLERA SP.* AND *FUSARIUM OXSISPORUM*

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Green tea polyphenols (to include the four major polyphenols: epicatechin, epigallocatechin, epicatechin-3-gallate, and epigallocatechin-3-gallate) have been reported to possess high antimicrobial activity, for instance against *Vibrio cholerae* O1, *Streptococcus mutans*, *Shigella* and other microorganisms.

The objective of the present work was to test green tea extract activity against pathogenic fungi *Drechschera sp.* and *Fusarium oxysporum* Schlecht. Green tea extract (22% polyphenols) was commercially available at the JS "Kolkheti-93" (Tsalenjikha, Georgia). Agar well diffusion method was used to investigate antimicrobial properties of Green tea extracts. The strains of test microorganisms were inoculated in Petri dishes containing agar media considered favorable for the growth of the microorganisms. 50 µl aliquots of the green tea extracts solutions were placed into agar wells (12 mm, diameter). The plates were incubated at 37 ^{0}C for 24 h. Antimicrobial potential of the plant extracts was estimated by the diameter of the inhibition zones around the wells. Green tea extract completely destroyed a membrane of fungus *Drechschera s.* There were no traces of fungus found by microscope analysis after treatment by the extract. In case of *Fusarium oxysporum* Schlecht green tea extract caused losing of sporulation ability of the fungus.

Conclusion: Green tea extract possess high activity against pathogenic fungi *Drechschera sp.*and *Fusarium oxysporum* Schlecht.

SOME INDICES ON RESISTANCE OF STONE FRUIT CROPS AND PIP CROPS TOWARDS DRYING

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Control against fruit during is too difficult as the general preventive measures of plant protection are not effective. That's why the plant resistance, establishment of resistance indices and application in practice are very important for the control.

The tests have shown that for the resistance of stone fruit crops and pip crops towards during such resistant indices as amount of ground water, ferments taking part in oxidation – restoration process, concentration of vitamin C, ability of phytoalexine formation, ets. are of great importance.

Each of the mentioned resistance indices has its function. For example the existed in the plant phenol compounds act on the excretion of substances and ferment activity as inhibitors. The ferments taking part in the oxidation – restoration process cause the inactivation of toxic substances excreted by the fungi. Phytoalexines retard the growth and development of the fungi causing drying.

Their inhibited action on the pathogen is marked only after accumulation of fungicidal concentration. These substances accumulated in the plant up to fungitoxic concentration play the protective function against the phytopathogenic organisms.

EVALUATION OF WHEAT GENETIC RESOURCES ON RESISTANCE TO RUST DISEASES

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Wheat is the most important crop in Azerbaijan. Rusts are common fungal diseases in wheat growing area. Yellow rust is the most important pathogen that has decreased considerably wheat productivity (in some seasons up to 40%) in the country. The selection and breeding of plants with genetic resistance is the most cost-effective and environmentally appropriate technique for crop disease management. Germplasm collections are important sources of resistance to yellow and leaf rust and most of the resistant lines identified with differing levels of resistance.

The work on development of resistant varieties was based on the screening of a large number of introduced germplasms. In total about 2500 introduced entries were screened in Apsheron under natural epidemic conditions.

On the base of carried out observations of about 2500 samples received from CIMMYT and ICARDA possible to make conclusion that on infection of yellow and leaf rust possible to divide into 3 groups: resistant, moderate resistant, susceptible.

To resistant and moderate resistant to yellow rust variety unascertained. The Sample basically were to yellow rust, amongst them following; (8th WONSA 125 samples 98,5%; 9th WONIR 125 samples 73,6%; 13th FAWWON 150 samples 56%; 16th HRWSN 172 samples 70,2%; 38th IBVSN 287 samples 65,2%; 26th ESWYT 150 samples 76%) and others In respect of to borax to rust picture was following: 80% sample were firm, (9th EYTSA; 10th EYTIRR; 38 IBWSN; 26 ESWYT) and others but 20% possible refer to unstable, (9th WONIR 125 samples 85,6%; 13th FAWWON 150 samples 84% 6th ERWYT-MR-KA 147 samples 59%; CWANA -1st DSBWYT 172 samples 96%; 1LSSN 187 samples 96,3%) moderate resistant sample is not discovered.

The Determination firm sample enabled to recommend them in breeding of the wheat for reception firm to borax to rust sort.

WHEAT BREEDING ON YELLOW RUST RESISTANCE

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The most effective method of grain crops diseases control is a breeding on resistance. Creation of resistant grain crops varieties with long preservation of high or moderate resistance to the most widespread fungal diseases is very important.

Last years breeding on resistance goes to direction of creation of race specific varieties with, vertical resistance, varieties resistant to one or several dominating in a pathogen population of races. Does not pay attention to reaction of created varieties to many light spread, race and biotype of pathogen with insignificant percent in a population. However these rather insignificant races or biotypes frequently also give rise new high virulent races causing epiphytoty of diseases.

Creation of varieties, possessing resistance to one of races of pathogen is very actualy. It is considered that, the more quantity of resistance genes possesses variety is long it can to keep resistance. The yellow rust causes enormous damage to a crop and is one of the most harmful diseases of wheat. Resistance of wheat to yellow rust is caused by presence at them separate genes of resistance and their combinations. Genes of resistance of wheat not appears if in yellow rust population contain corresponding virulence genes which can be shown at one or several stages of development of plants. Investigations were carried out in Apsheron conditions.

In connection with these are carried out researches of resistance of various hybrid lines. Uredospores have been collected from plants of various nurseries. Investigated lines artificially inoculated by yellow rust. Plants before the beginning of infection irrigated and then sprayed with water. After these operations they inoculated by suspension of uredospores and then the infected plants became covered by a polyethylene for creation of the damp chamber for germination of spoors. During these actions in 5-6 p.m. next morning by 9-10 a.m. removed the damp chamber. During vegetation of plants necessary phenological observations and the reaction of tested materials i. e. the type and severity of the infection were recorded at flag leaf stage by modified Cobb"s scale. The plants inoculated twice. These specified terms have been dated accordingly for phases of development of plants, early tillering and early heading. The comparative analysis of infection of variety samples on natural and artificial inoculation conditions is lead. Lines differing on complex attributes have been selected. Inheritance of resistance indication to rust diseases was carried out by immunity studying of parental forms and to reception of I and II hybrids generations. 12 parental forms, 6 hybrids of I and II generation are analysed. Data of our experiments confirm well-known thesis, that resistance to yellow rust in most cases dominates over hybrids of I generation or is inherited intermediate. In hybrid combination "Azamatly 95 x Mirbashir 128" resistance to yellow rust inheritance from mother form the Azamatly 95. Thus resistance equally can be inherited is prepotent without dependence from a direction of crossing. At crossing of two resistant parents, resistant hybrids turn out, but depression of resistance, when resistance of hybrid below resistance of both parents, on yellow rust is sometimes observed. In hybrid combinations Zimorodok x Azamatly 95 on yellow rust there is no precise inheritance of a resistance indications - intermediate inheritance of resistance is marked.

STUDY OF RESISTANCE AND PRODUCTIVITY OF NOVEL SORTS OF POTATOES FOR DIFFERENT SOIL-CLIMATICS CONDITIONS OF GEORGIA

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The 2008 year was nominated by UN as a year of potato because of its multi-beneficial properties. *Phytophtora infenstans* (Monti) de Bary which causes Phytophthora blight of potato is a very strong parasite. Also, it is well known about high variability of its genetics and physiology. Our long time experiences under various climatic and soil conditions in Georgia (Mestia, Oni, Tsalka, Akhaltsikhe, Khulo) showed that the sorts of potatoes resistant against Phytophtora infenstans were characterized with high productivity. The following sorts of potatoes with high resistance against Phytophthora blight and high productivity were selected from the selection stations: Lvovjanka, Mavka, Prybrezhni, Nesterovski and Prykarpatski. These sorts were given to the National Committee of Tests of Sorts which decided to implement the Lvovjanka sort of potato in Akhalkalaki and Tsalka regions. During 6-7 years the resistant sorts of potato may become vulnerable to the *Phytophtora infenstans* again. Therefore, it is reasonable to change the sorts every 6-7 years.

There are three vertical cultivating zones of potatoes in Georgia. The first zone is located under 800 m of sea level, the second zone is between 800 and 1200 m, and the third zone - is over 1200 m of sea level. The first zone is characterized by hot summer. Early harvesting sorts of potatoes are more perspective sorts here. Agro-climatic conditions of the second and third zones are most preferable for potatoes cultivation. These zones are characterized by optimal rainfalls and temperature conditions for potatoes.

In conclusion, high resistant and high productivity sorts of potatoes have to be selected out of foreign selection stations and these sorts have to be tested in various soil and climatic conditions of Georgia.

EFFECTIVENESS OF FUNGICIDES AGAINST TO WHEAT LEAF SPOT DISEASES IN GEORGIA

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Leaf Spot diseases of wheat are wide-spread all over the world and Georgia is not an exception.

The goal of our study was the estimation of harm of wheat Septoria Glum Blotch (*Septoria nodorum* Berk) and Pyrenophorose (*Pyrenofora tritici-repentis (Died.)Drechsler)* and effeciency of fungicides against these diseases. The work was conducted in the Septoria Infection Nursery (Kobuleti), with the generally accepted methods, elaborated together with ARSRIPhytopathology (Golicino). Inoculation of the six of the most cultivated in Georgia varieties (Vardzia, Bezostaya-1, Krasnodarskaya 99, Russa, Pobeda50 and Copper) was made with mix of strains, which were collected in the different geographic zones of Georgia. System fungicides- Tilt 250, Alto Super and Baileton were used for experiments.

Data analysis has shown that both diseases are quit harmful for wheat in Georgia. The Losses of harvest varies within 15-49% (depended on varieties). The most effective were fungicides Tilt 250 and Alto Super in comparison with Baileton. These preparations decreased the defeat index by 31-60% and increased harvesting by 14-25% (depended on varieties).

THE ANTAGONIST FUNGI SUPPRESSING THE PATHOGENIC MICROMYCETES OF THE PLANTS

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Protection of the agricultural plants against the harmful organisms, with an aid of the means safe for environment and humans, with usage of one of the alternative methods – biological measures, is the pressing problem of today. It serves an objective of establishing and preserving the healthy environment for the whole society.

Determining an interrelation between the microorganisms and plants in the rhyzosphere and investigations of the processes therein, permitted monitoring of the plant development, its natural defense capacity, and general endurance elevation.

In the rhyzospheres of the cultured agricultural plants the following antibiotic-producing antagonistic fungi have been revealed – *Aspergillus, Alternaria, Gliocladium, Chaetomium, Trichoderma, Trichothecium, Penicillium,* etc. investigation and implementation of which confirmed their role in suppression of the plant pathogenic mycomycetes.

The substances, which are obtained from the cultural filtrates of the antagonist fungi, protect seeds, shoots, and sprout from the pathogenic microorganisms and later, due to
stimulation of growth and development, produce significant effect in increase of their endurance against the harmful organisms.

On the basis of the antibiotic substances produced by the antagonist fungi, the fungicidal biological preparations have been created, a positive influence of which on the plants' growth and development has been determined experimentally.

Because of the multi-functional role of the antagonistic fungi, which is shown in the plants' rhyzosphere, the following is revealed: suppression of the phytopathogens' development, their inhibition, stimulation of the plants' growth and development. Increase of the plants' resistance against the diseases, increased capacity for the crop quality and volume. An interest for creation of the dry and liquid fungicide biopreparations, on their basis, has been erased, with the respective names: *Trichodermin - TL; Trichodermin – TK; Trichodermin – MB; Ketomiumin – A; Ketomiumin – G.*

Implementation of the biofungicidal preparations against the pathogenic microorganisms in the agricultural cultures, has shown to be effective, safe, economically valid, and promising, as the means of biological struggle.

MONITORING OF WHEAT DISEASES AND BREEDING OF RESISTANT VARIETIES

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Wheat is a staple crop with significant contribution to food security in Tajikistan. Annual production of wheat grain is increasing (600,000-700,000MT), however the yield is remaining very low (1, 3-1, 4 t/ha) due to lack of good quality seed of high yielding varieties, tolerant to biotic and abiotic factors. Monitoring of development and spreading of wheat diseases conducted in different agro-climatic zones of Tajikistan allowed to identify about 20 dangerous diseases. Fungal diseases, like yellow rust (*Puccinia striiformis* f.sp. *tritici*), leaf rust (*Puccinia recondita*), tan spot (*Drechslera tritici-repentis*), septoria leaf spot (*Septoria tritici)*, wheat glume blotch (*Septoria nodorum*), take all decline (*Gaemannomyces graminis var. tritici*), common bunt (*Tilletia caries, T. foetida*), loose smut (*Ustilago tritici*) as well as diseases caused by fungi *Fusarium* species, *Bipolaris sorokiniana, Ophiobolus graminis* and others. Among bacterial diseases most dangerous ones are basal glume rot (*Pseudomonas syringae*) and bacterial streak (*Xanthomonas campestris*)

The most dangerous wheat disease in Tajikistan is yellow rust that significantly reduces grain yield. Therefore the breeding strategy aimed to develop wheat varieties resistant to yellow rust. Introduction of new varieties and germplasm received from CIMMYT, ICARDA and other international breeding programs are the main source of selection of resistant varieties. A number of high yielding varieties resistant to yellow rust and good bread making quality selected and released.

POTATO DISEASES – MAIN CRITERIA FOR SEED CERTIFICATION

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Soil and climatic conditions of mountainous regions of Tajikistan are suitable for production of good quality seed potato. However potato is damaged by different diseases and pests during growing in the field and during storage. Research conducted during recent years confirmed that potato in Tajikistan is mainly damaged by viruses' X, Y, A, M and their combinations as well as by mycoplasma, fungus, bacteria and nematodes. Very often the symptoms of potato mosaic, stolbur, bbacterial soft rot, black leg, common scab, rhizoctonia canker or black scurf, dry rot, phoma tuber rot, leak or watery wound rot and other diseases observed. Although the late blight *(Phytophthora infestans)* occurs regularly in Tajikistan, it is less dangerous in dry conditions of the country.

Certification of seed potato requires proper diseases control during production and storage. Virus-free seed potato multiplication using meristem culture in vitro maintained to control viruses for production minitubers, SSE and SE. Combination of control measures recommended for combating potato diseases. Strict virus control using modern techniques in this process is the main requirement for seed certification. Clone selection used for further multiplication of seed potato is important to control other diseases, especially phizoctonia, root rot, nematodes and other diseases in seed crop.

The study carried out on potato diseases was used for development of seed quality assurance guidelines, national seed potato certification scheme and seed quality standards.

MEASURES OF INCREASED RESISTANCE OF CITRI TOWARDS MALSEKO

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Among lemon diseases fungus *Phoma tracheiphila,* "Malseko" is distinguished by its damage and the best sort "Kartuli" is more susceptible to it.

Fungus is easily permeable to the plant from the damaged points and it causes vessel stuck and plant drying as well. According to many results of carried out researches the most susceptible reaction of cell and permeability of cell membrane play a great role in the protective reaction of a plant. In order to increase the resistance, the plants have been fed sulfury containing organic mineral preparation. The best example was khelate solution.

Permeability of cell membrane has been determined between diseased and healthy leave cells by means of conduct metric method according to the difference of electric potentiality.

By the results of this research it was established, that in non-fed plant leaves under control the sensitivity of healthy leaves is equivalent to 31A while in diseased ones it is equivalent to 40A. Sensitivity is increased by 29% in comparison with healthy leaves, while in plants fed by khelate, sensitivity is increased only by 8% in comparison with healthy ones and in sulfur fed preparations by 11%.

As it is shown from the results, in case of plant disease the increased permeability of cell membrane is being occurred not only in fed plants, but in non-fed plants as well. Though in non-fed plant increasing tendency of cell membrane permeability has been observed. Increased permeability is far more less in fed plants which indicate to the reduction of pathological processes. Besides, the fed plant are distinguished by growing size and by colored leaves as well which notes to the positive results of feeding and feeding plants are promoting to increasing of resistance of lemon plants to Malseko.

PREVALENCE OF APPLE SCAB AND EFFECT OF SOME APPLIED FUNGICIDES IN THE SUBMONTANE ZONE CONDITIONS OF ARARAT VALLEY

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The most harmful and widespread apple disease is scab caused by *Venturia inaequalis (Cke.) Wint*. Disease severity and incidence in the sub-montane region of the Ararat Vall*e*y was greater in 2006 than in 2007. In 2006, for leaves and fruit, infection was 36.7 – 68.4% and 21.7 – 53.7%, respectively, compared with 13.0 – 18.8% and 10.6 – 12.7% in 2007.

Under these conditions the leaves were the basic source of transmission the infection from year to year, asci being producing throughout the year.

In 2006, of the fungicide treatments used Scor and Zato were the most effective, giving 95.6 – 97.5% and 91.5 – 95.0% biological efficacy, respectively.

In 2007, a further the preventive spray with Kuproksat (5kg/ha) was included and Scor and Zato were tested against this background. The testing was conducted in two parts: 2 sprayings – for the first time and 3 sprayings –for the second time. It was found out that even under the low infection in the control the 2 sprayings with Scor and Zato did not give the expected control and it was necessary to spray the third time in order to achieve 86.0 – 90.0% biological efficacy.

EVALUATION OF LOCAL GEORGIAN WHEATS FOR RESISTANCE TO FOLIAR DISASES

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Local Georgian wheats are important sources of genes for resistance to diseases. Seven species *(Triticum Cartlicum-Dika, Triticum timopheevi-Zanduri, Triticum macha, Triticum spelta, Triticum georgicum, Triticum durum, and Triticum monococcum*) and twelve variations (mainly endemic) Tsiteli Dika (var.*rubiginosum*), Tetri Dika (var.*stramineum*), Shavi Dika (var.*fuliginosum*), Spelta Shebusuli, Spelta Sheubusavi, *Tr. Monococcum*- Gvatsa Zanduri, *Tr.timopheevi* -Chelta Zanduri, *Tr. Macha* (var. *megrelicum*, var. *paleokolchicum*, var. *sharashidze*) were evaluated to heavy artificial infection of Georgian populations of seven foliar diseases: stem rust (caused by *Puccinia graminis f. sp. tritici*), leaf rust (caused by *Puccinia triticina f. sp. tritici*), stripe rust (caused by *Puccinia striiformiis f. sp. tritici*), powdery mildew (caused by *Blumeria graminis f. sp. tritici*), tan spot (caused by *Pyrenophora tritici-repentis*), Septoria leaf blotch (caused by *Mycosphaerella graminicola)* and glume blotch (caused by *Phaeosphaeria nodorumi*). Nearly all wheat species and variations were resistant and moderately resistant to rust species. Exception is Tsiteli and Tetri Dika which were susceptible to all rusts. Accessions with resistance to Powdery mildew were less frequent in the collection than those with resistance to rust pathogens. Resistance to Glume blotch, Septoria leaf blotch and Tan spot was detected in 21, 42 and 26% of the tested accessions, respectively. *Tr. Georgicum* – Colkhuri Asli and Gvatsa Zanduri were resistant to all diseases.

Natural populations of local Georgian wheats which contain large amounts of disease resistance genes are widely used for breeding programs for producing new resistant cultivars all over the world.

PROTECTION OF WINTER WHEAT FROM COVERED SMUT IN LOWER POVOLZHIE

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Covered Smut, caused by *Tilletia caries* (DC.) Tul. = *T. tritici* (Bjerk.) belongs to one of the most harmful diseases of winter wheat. The most effective fungicides and biopreparations have been studied for years by us, from the point of their influence on the development of Covered Smut.

Widely cultivated in Saratov Region varieties - Gubernya, Saratovskaya Ostistaya, Saratovskaya 90, Mironovskaya 808, Donskaya Bezostaya were used for experiments. Kolfugo Duplet, Premis 200, Vitavaks 200 FF and Tebu 60 were used as a kind of fungicides. General methods were used while doing experiments.

Fungicides Kolfugo Duplet and Premis 200 were totally protected all winter wheat varieties from Covered Smut (the defeated in control was 11, 8-54, 6%, depended on variety). The same preparations influenced positively on sowing quality of seeds, growth and development of plant and harvesting of winter wheat. Kolfugo Duplet increased harvesting for 8, 2 – 47, 4 %; Premis 200 for 5, 4 – 31, 8 %, correspondingly. Preparations Vitavaks 200 FF and Tebu 60 decreased development of Covered Smut for 82, 4 – 94, 2 % and 76, 3 – 85, 1 %, correspondingly.

The above mentioned preparations did not make essential influence on the agriculturally- useful character of varieties.

POTENTIAL USE OF SOME FLOWERS EXTRACTS AGAINST *XANTHOMONAS CAMPESTRIS PV. CAMPESTRIS*

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In order to maintain the productivity of various crops, more and more synthetic chemicals are being added in the natural environment by the farmers, which enter the food chain through water, soil and air as a result it seriously affect the human health. According to the WHO survey, more than 50,000 people in developing countries are annually poisoned and 5,000 die as a result of the effects of toxic agents, used in agriculture. In India 35,000 – 40,000 tons of hazardous chemicals are sprayed on the crops every year, instead of helping the poor, these chemicals are causing cancer, sterility and death.

So there is an urgent need to develop sustainable methods for these horrible diseases. As plants and their product are known to possess various secondary metabolites, which showed inhibitory effect against the growth of pathogens, therefore, the plants and their product should be utilized to combat the diseases causing pathogens. Keeping these problems in view, efforts are underway to search economic safe phytochemicals, which could be utilized for disease control.

The aqueous extracts from twenty plants were screened by agar diffusion methods for their antibacterial activity against *Xanthomonas campestris* pv.*campestris*, a causal organism of black rot of cabbage and cauliflower. *Xanthomonas campestris* pv.*campestris* was found most sensitive to the leaf extract of *Camellia sinensis*. Some of the other plants such as *Acacia arabicae*, *Aegle marmelos*, *Acacia catechu*, *Achyranthus asper*, *Asparagus racemosus*, *Azadirachta indica*, *Callistemon lanceolatus* and *Acacia fernesiana*, also showed the inhibitory effect against the test bacteria.

ROLE OF THE INTERNATIONAL NURSERIES IN CREATION OF WHEAT VARIETIES TOLERANCE TO YELLOV RUST

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Wheat in Azerbaijan, with the purpose of maintenance of need of the population of the country food products, is considered strategic culture. Therefore it is annually cultivated in various regions of republic on a sowing campaign more than 580 thousand hectares. Proceeding from it, it is required to develop effective selection strategy for concrete agro ecological region. In the decision of this most important question, as well as with local collections, introduced materials have played great role on received on a program of international selection centres of CİMMYT and İCARDA. The Azerbaijan scientific research institute of Agriculture under the cooperation agreement receives various nurseries of wheat by program of CİMMYT and İCARDA every year.
Since 1995 the institute receives on a line of the listed centres of 20182 lines bread and 8188 durum wheat which are placed accordingly in 234 and 99 nurseries. From the received 333 nurseries of 18,2 % are prepared within the limits of joint programs of CİMMYT and İCARDA; 8,6 % from Turkey, CİMMYT, İCARDA; 18,6 % from CİMMYT and 54,6 % from İCARDA

More than 35 % studied samples of wheat were susceptible and (20-90 S) and medi-susceptible (5-80 MS) to yellow rust. Basically “the International bread wheat screening nursery” concerned to such nurseries (IBWSN), “Semi-arid wheat yield trail” (SAWYT) directly received from Mexico on line CIMMYT. As a whole, more than half of samples tolerances to diseases have appeared moderately resistant (10-30 MR) and resistant (5-10 R).

For this time interval from the international nurseries for selection works than thousand perspective samples of wheat distinguished on tolerance to yellow rust are allocated more. To such nurseries concerns “facultative/winter wheat observation nursery” (FAWWON), “Winter wheat observation nursery for irrigation (WWONIR) and semi-arid areas (WWON-SA) conditions”, “Regional bread wheat yield trail” (RBWYT) and etc.

As a result of many years joint researches, with the purpose of division into districts of 5 varieties of bread wheat allocated from the international nurseries are transferred in the State Commission on Trail and Protection of Selection Achievements. 3 varieties of bread wheat “Azamatli 95”, “Nurlu 99”, “Gobustan” differed high productivity and tolerance to yellow rust which are widely cultivated on greater areas under crops of republic are as a result zoned.

MECHANISMS OF INDUCED RESISTANCE OF POTATO PLANTS TO THE BIOTIC FACTORS IN SIMULATED MICROGRAVITY

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Gravitation is a necessary condition for the growth and spatial orientation of plants and any disturbance of g-vector instigates the changes in the structure, organization and physiological balance of plant organism. In our previous works we demonstrated elimination of the wheat streak mosaic virus (WSMV) under influencing of the microgravity simulated by clinostats. In these tests we studied the effects of simulated microgravity on potato plants infected with PVM and PVX. In Krymska Rosa variety plants we observed an intensive decrease in PVX antigens content under the influence of clinostating. In plants of stationary (not clinostated) controls, there was the opposite process of PVX antigen accumulation. The Agave variety plants showed some decrease in antigen content in all test variants. The effect of simulated microgravity in this case showed itself in a more active reduction in PVX antigen content in test variant with vertical clinostating. Prolonged clinostating reduced the accumulation of PVM antigens in Zdabitok variety plants, but did not suppress it completely. This proves the low sensitivity of the system "PVM – host plant" to the action of simulated microgravity. Our research results allowed us to presume that the liberation of plant from the virus in simulated microgravity takes place in the process of induced resistance formation. We studied this factor on the relationships in the system "virus – host plant" in simulated microgravity creates by clinostats.

USE OF ANTAGONISTIC TRAITS OF *TRICHODERMA* GENUS FUNGI FOR BIOTIC REGULATION OF CUCUMBER ROOT ROT

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The results of cucumber diseases records in greenhouses of the Republic show that root rot is present everywhere, by the end of picking maturity in 1999-2007 the disease spread was in the range of 32,1-87,5%, the development - 20,4-51,9%. By our researches it is established that root rot-causing phytopathogenic complex includes *Fusarium oxysporum* Schlecht.emend. Snyd. et Hans. fungi (dominating species), *Fusarium moniliforme* Sheld. and *Fusarium solani* (Mart.) App. et Wr.

In the laboratory screening it is determined that the fungi *T.viride (lignorum)* T 13-82 and *T. harzianum* S-4 – a basis of biopreparates trichodermin-BL and lignorine , ps –render an expressed antagonistic activity in relation to cucumber root rot agents and inhibit *F. oxysporum* growth for 42,2-56,6%, *F. moniliforme* – for 49,5-51,0%, *F.solani* – for 38,8-47,1% in the head crop.

The results of researches show that the highest protective effect against root rot was with three times application of preparates trichodermin - or lignorine, ps by way of root watering. The application of 2% trichodermin-BL working solution provided with the biological efficiency from 35,0 to 60,5% by the disease development in the control for 15,8-32,5% and yield increase from 20,0 to 73,0%. By cucumber plant treatment with1% lignorine, ps working solution, the biological efficiency has reached 65, 4% by the disease development in the control up to 43, 3%.

INFLUENCE OF VITAMINS ON GROWTH AND TOXICITY OF FUNGUS *PHOMA TRACHEIPHILA* (PETRI) KANT. ET GIK.

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It was studied, an ascorbic acid's (vit. C), thiamin's (B) and riboflavin's different concentration's (0.01 %, 0.02 %, 0.05 %, 0.1 %, 0, 5 % and 1 %) influence on growth and caused of Malsekko citrus plants of fungus *Phoma tracheiphila*.

It is established, that at presence in Chapek's liquid nutrient medium of, an ascorbic acid and thiamin are significantly inhibited growth of fungus. At the same time, when cultivating the fungus on these nutrient medium there is observed a decrease in toxicity of the cultural filtrates, which can be explained by the inhibition of the development of this fungus. It is established, that as against ascorbic acid and thiamin, the riboflavin is stimulated development of the fungus and does not reduce intensity of accumulation of toxic substances in cultural filtrates.

On the basis of the received data it is possible to assume, that resistance of plants to Malsekko is in some connection with parity of the contents in a plant of an ascorbic acid, thiamin and riboflavin. In particular the high maintenance of an ascorbic acid and thiamin should promote to delay an introduction of fungus *Phoma tracheiphila* in a plant and to increase of resistance to Malsekko. The high contents of the riboflavin, on the contrary promotes introduction and distribution of the fungus in fabrics of a plant. The received data should be taken into account by development of methods of diagnostics of parameters of resistance to Malsekko.

THE ACTION OF *FUSARIUM OXSYSPORUM F. SP. ORTHOCERAS* ON THE SUNFLOWER BOOMRAPE IN GEORGIA

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The parasitic weed broomrape *(Orobanche* spp.) is chlorophyll-lacking root parasite that parasitize many dicotyledonous species, causing severe damage to vegetable and field crops worldwide. Sunflower broomrape (*Orobanche cumana* Wallr.) is a specialized pest of sunflower (*Helianthus annuus* L.) and occurs in high infestation levels in sunflower production regions of East Georgia causing severe yield losses. Broomrape seeds germinate only after a conditioning period and then as a response to stimulants secreted by plant roots. The germinating seed produces a radical that forms a haustorium when it comes into contact with the root surface and penetrates the root tissue establishing connection with the host vascular system. Control methods are scarce and only partially effective. Under such circumstances there is a need to develop new and effective control methods.

The fungus *Fusarium oxysporum* f. sp. *orthoceras (FOO)* attacks *O. cumana* at all developmental stages. The fungus was introduced from Israel (under the project USAID-Israel-Georgia, TA-MOU-02-CA22-016) as a potent host-specific pathogen of *O. cumana.* Laboratory and greenhouse experiments were conducted in order to investigate the influence of *FOO* on *O. cumana* on sunflower variety - "Donskoy-60". Treatments were applied 25-30 days after sowing, when the sunflower plant was at the 8-10 leaves stage. One hundred millilitre of the FOO strain suspension was uniformly distributed on the soil surface of each pot at 5 times, at two-week intervals. The fungus caused complete control of the parasite. The inflorescences above soil as well as the underground parasite were deteriorated and died without any negative effect on the sunflower plant. These results obtained in this project indicate that *FOO* is potent biological agents with high efficacy to control *O. cumana* under the conditions prevail in Georgia and it may serve as an important component in Integrated Pest Management (IPM) for sunflower broomrape management.

ABOUT ENTOMOPATHOGENS FUNGUS IN AJARIA CITRUS AGROCENOSIS

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Scales (*Diadpidae*) barks (*coccidae*), mites and plant louses are the most harmful in citrus plantings. The materials about their pathogenic fungus are much little. Many entomopathogenic organisms are exposed in process of the monitoring. Fungus *Cephalosporium lecanii* (which is spread on the Japanese *(Ceroplastes japonicus)* and Chinese (*Ceroplastes sinensis*) scales and on the soft (*Coccus hesperidium*) and yellow (*Aonidiella Citrine*) barks are wide-spread of them. This fungus liberally spreads in the nature and effectively checks these wreakers, in all phase of their development. Fungus *Ashersonia sp.* is discovered on the japanese (*Leucaspis japonica* Ck.) and brown (*Chrysomphalus dictyospermi* M.) scales and on the pulvinaries (*Chloropulvinaria aurantii* Ck.) as well as on the potato's green plant louses in the Citrus agrocenosis. We prepared and applied artificially suspense of *Ashersonia* for the reason of determination of its efficiency. The result was the massive destroy (90-95%) of the wreakers worms. During the monitoring on the mites there was not natural entomophatogens. In spite of silver mites (*Phullocoptuta oleivorus Ash.*) we practiced biopreparation of new class Spinosad-240, which is received on base of *Sacharopolyspora spinosa* of soil actinomicetes. After the using of this preparation, during 24-48 hours were destroyed 98% of mites.

PLANT PROTECTION SITUATION IN GEORGIA

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According to the following regulations is regulated Plant Protection sphere in Georgia: Georgian law on Plant Protection from Harmful Organisms; Georgian Law on Agricultural Quarantine; Georgian Law on Pesticides and Agrochemicals, and number of sub legislative acts. Following international Regulations are enforced in Georgia: International Plant Protection Convention; Agreement on Sanitary and Phitosanitary Measures; International Codex of Distribution and use of Pesticides (FAO); Rotterdam Convention Interim PIC Procedures.

Plant Protection measures are carried out by the Plant Protection Department of the FVP that was established in 2006 on the basis of Georgian Law on Food Safety and Quality.

Plant Protection Department enrolls Division of Phitosanitary Control and Monitoring, and Division of Surveillance on Plant Protection Measures and Agrochemicals. 85 persons are employed in the sphere of Plant Protection both in local and central divisions. Department of Plant Protection performs methodic guidance to the Adjarian and Abkhazian services.

Plant Protection Department fulfils obligations as following: Phitosanitary monitoring of the sowing agricultural crops and plantings, forest species for exposure harmful organisms, diseases and weeds, their diagnostics, forecast of their spread, distribution of alarms; Phitosanitary protection of Georgian territory from penetration and spread of the quarantine and dangerous harmful organisms, management and control for their eradication. Issuance of certificates on imported plant products; Performance of quarantine examination and decontamination. Establish of state control on fulfilling quarantine rules by natural persons and legal entities that are involved in production chain.

Surveillance on use and safe treatment with pesticides and agrochemicals with fulfillment of all regulations codes and rules. Control of all activities referred to pesticides and agrochemicals, registration of producers, importers, packers, distributors, storing places of pesticides and agrochemicals. Control of pesticides and agrochemicals quality. Collection of assortment of pesticides, planning and establishing of surplus fund for eradication of emergency situations. Management of testing, examinations and state registration of pesticides and Agrochemicals. Establish of list of pesticides and agrochemicals allowed to use on Georgian territory. Advisory assistances to the farmers, working up new effective and safe technologies in the sphere of plant protection. Elaboration of projects of regulations in the sphere of plant protection. Exposure of violations of law in the sphere of plant protection and control on fulfillment of regulations.