Result Of Using Plant Bio-Preparation Against Plant Disease And Pests

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ABSTRACT

Chemical pesticides used for vegetables and crops, which are widely used against pest and diseases,raise the risks for human health and the environment. Therefore, it is necessary to investigate the effect of plant extracts, those having pesticidal activity against plant pests. In Mongolia, chemical pesticides are expensive and are inaccessible. Thus, for the study of pesticide activity, we prepared extracts from some plant, which have effective substances and chemical composition against pests and diseases such as nettle (Urtica cannabina L.), wormwood (*Artemisia sp.)*, black henbane (Hyoscyamus niger L.), field horsetail (Equisetum arvense L.) and field sowthistle (Sonchus arvensis L.).

It was concluded that the biological efficacy of plant extracts against diseases of potato, cucumber and tomato were 41,0-67,0%, and the use of 1% solution of wormwood, black henbane extract against cabbage moth showed 68,1-79,4% biological efficiency.

Key word: Phyto-fungicide, Phyto-insecticide, disease distribution, disease process, biological efficiency

INTRODUCTION

Modern agriculture technology uses pesticide and mineral fertilizers could massively increase food production and feeding people around the world. But it is leading to many problems in human health and environments. Therefore to change it with different types of pesticides, which are highly selective, with low toxicity for warm blooded animals, and with different mechanism is necessary. For such reason study work for searching plant substances with pesticide activity is important. Harmful organisms are common problems during production for natural, ecological pure crop and vegetables that are safe for human health. Using natural products for controlling their number and decreasing their harm are more safely and have lower risks (Shivendra, 2003; Leatemia, 2004; Isman, 2006). In our country the chemical pesticides are more expensive, and are unusual. The research aim was to making preparations against pest and plant diseases based on plant chemical compositions

RESEARCH MATERIALS AND METHODS

In this study we used Nettle (*Urtica cannabina* L.), wormwood (*Artemisia sp.*), black henbane (*Hyoscyamus niger* L.), field horsetail (*Equisetum arvense* L.), field sow thistle (*Sonchus arvensis* L.), which are common grown in Mongolia, has common statusand have pesticide activity. The samples of these plants are collected from the nature and the bio-preparationsare made withextracting method using stem, root, seed and leaves. These bio-preparations are tested in the natural fauna against plant diseases and pest.In some experiment versions chemical pesticides used as ethalon or for comparative estimation of the biological results. Gymnast (2кg/he) against potato phytophthora and alternarosis, nettle preparation (1%), Rayok (0.3 l/he) against tomato alternariosis, nettle preparation (1%), phytoverm (1,5 l/he), wormwood extract (1%), black henbane extract (1%), and Tiovit Jet VDG, nettle extract (1%), field horsetail (1%), field sow thistle (1%)against tomato phytohphthora and cucumberpowdery mildew.

Estimation of the biological activities in plant preparations against plant diseases: The fungicide activity of the plant preparations are tested in the field with injured plants. The biological activity is calculated using spread of disease and disease process or harm level as using the following formula.

$$P = \frac{n}{N} \cdot 100$$

P-disease spread

n-injured plant in sample

N-total plant number in sample

The plant disease process (harm caused by plant disease) is estimated with percent and scores. A common used score methods is the following.

0– plant disease characters;
1–10% of the whole plant or specific area are injured;
2–11 – 25 % of the whole plant or specific area are injured;
3–25 – 50% of the whole plant or specific area are injured;
4– over 50% of the whole plant or specific area are injured.Estimate the biological activity with the plant disease harm levels in experiment and controls, the Abbot formula is used.

$$Э = \frac{(K - O) \cdot 100}{K}$$

$Э$ –Biological result, %
K –Disease process in control, %
O –Disease process in versions using plant preparations, %

Estimation of the biological activities in plant preparations against pests: Phytoverm (Ethalon), wormwood extract (1%), black henbane(1%) extract were used against cabbage moth. The experiment field is with 50 m². And we sprayed repeated lyat the leaves of the cabbage heads are in the opening stages, about 5% to 10% of the whole plants are covered, and 2-5 or 2-10 caterpillars were on each cabbage plants. Count the larvae numbers in 25 plants with diagonal directions after and before spraying the preparations. We calculated the results before and 3,7,14 days after the spray. The biological activities of the preparations were calculated by Henderson and Tilton's (1955) formula.

$$E = 100 \cdot \left(1 - \frac{O_n K_d}{O_d K_n}\right)$$

E-biological result,%
O_n-alive caterpillar number before the experiment
O_d- alive caterpillar number after the experiment
K_n- alive caterpillar number in control before the experiment
K_d-alive caterpillar number in control after the experiment

RESEARCH RESULT

1. ***Estimation result of the biological activities in plant preparations against plant diseases:*** In the table 1 the biological activities of nettle extract (1%) against Potato phytophthora and *alternariosis*, field tomato *alternariosis*, phytophthora in greenhouse tomato, and cucumber powdery mildew, field horsetail (1%) extract against greenhouse tomato powdery mildew to phytophthora and cucumber powdery mildew field sow thistle (1%) extract against (1%) cucumber powdery mildew (Table1) were shown.

Table 1. Results of Plant extract and fungicide against tomato, cucumber and potato diseases

Experiment versions	Dosage	Disease process (%) (2 weeks after)	Biological result (%)
Tomato (field)			
		Alternariosis	
Rayok	0.3 l/he	1.8	80,8
Nettle extract	1%	3,1	67,0
Control	(Water)	9.4	-
Potato			
		Phytophthora	
Gymnast	2 kg/he	5,4	85,0
Nettle extract	1%	17,4	65,9
Control	(Water)	36,1	-
		Alternariosis	
Gymnast	2 kg/he	2,6	88,4
Nettle extract	1%	8,1	65,2
Control	(Water)	23,3	-
Tomato (greenhouse)			
		Phytophthora	
Nettle extract	1%	10,8	41,0
Field horsetail	1%	8,7	52,5
Control	(Water)	18,3	-

Cucumber (greenhouse)			
		Angular leaf spot	
Field sow thistle	1%	8,4	61,6
Field horsetail	1%	9,9	54,8
Nettle extract	1%	10,2	53,4
TiovitJetVDG	50g/5y	2,4	89,0
Control	(Water)	21,9	-

The activity of the chemical fungicides against tomato, potato *alternariosis* and phytophthora were 80,8-88,4%, hence the plant preparation given 41,0-67,0% of biological result. From this result we can see that these plants have phyto-fungicide activities. Therefore, using plant derived bio-fungicides are ecology and environment friendly, and is more economy efficient. From the experiments we can see that Tiovit Get, including sulphureused against cucumber powdery mildew has shown89,0% biological activity while the result of the plant extracts were 53,4-61,6%.

***Estimation result of the biological activities in plant preparations against pests*:** At the table below the result of the plant extracts from wormwood (1%), black henbane (1%), field horsetail (1%), against cabbage moth (Table 2). The biological activity of Wormwood extract, black henbane extract, field horsetail extract were similar to Phytoverm with 68,1-79,4%, and is possible to use in plant protection as biological control.

Table 2. Result of the bio-insecticides against cabbage moth

№	Experiment versions	Dosage, l/he	Cabbaga moth larvae (per plant)		Biological result, %
			Before spraying	After spraying (7 day)	
1	Wormwood extract	1%	4,8	3.3	68.1
2	Black henbane extract	1%	5,4	2.4	79.4
3	Phytoverm	1,5 l/he	3,3	1.2	83.1
4	Control	Water	3,9	8.4	-

DISCUSSION

In recent years many foreign researchers studied the possibilities to use plants and their derivatives against harmful organisms and determined the phytoncide activities (Rodriquez E, 1988; Semakov, 1995; Chermenskay, 2000) [1, 6, 8]. Currently about 3000 species of plants are proven that have insecticide activities (. From all of those plants, the *Azadirachta indica* has a good insecticide activity, and shown the best activity against the pests (Schmutterer and Ascher, 1981, 1984, 1987; Stoll, 1988; Schmutterer, 1990; Latum and Gerrits, 1991; Downum et al., 1993) [9-13]. From our research result we discovered, that the blackhenbane, field horsetail have high phyto-insecticide activity. Also some the research works of some biological activity of plants against plant were conducted in other countries. In former researchers work stated that water extracts of 32 species of plants used for potato seed sterilization, and during growth stages are highly effective against potato phytophthora and pests (Kataewa, 2016) [5]. The extracts of common plants in Mongolian agriculture field known as weed such as nettle, field horsetail, and field sow thistle phyto fungicide activities were studied against plant diseases.

The extract of nettle (*Urtica cannabina* L.) against tomato and potato alternarios, phytophthora, the extract ofnettle (*Urticacannabina* L.), field horsetail (*Equisetum arvense* L.), field sowthistle (*Sonchus arvensis* L.) against cucumber angular leaf spot have high activity of phyto fungicide. And for the cabbage field for the cabbage worm the wormwood and black henbane extracts

CONCLUSION

are effective as insecticide. So these plant extracts with 1% can be used for plant protection.

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