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INFLUENCE OF USING PROTECTIVE-STIMULATING HUMIC-FULVATE COMPLEX ON IN VITRO MICROPROPAGATION OF KHASANSKY GRAPE

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***Abstract:** this work was carried out to study the effect of supplement ½ MS medium with (HFC) at the different concentrations (0, 0.1, 1 and 10 ml/ L) on In vitro rooting of grape cv. 'Khasansky'. The data observed that ½MS+ HFC 0.1 ml /l gave the maximum rooting percentage with improving the total length of root and length of new growth.*

***Key words:** fulvate complex, khasansky grape.*

Introduction. Grape (*Vitis vinifera*, L.) is one of the most important fruit crops in the world with approximately 74.28 million tons produced. About 50% of grapes are used for wine, one third is consumed as fresh fruit and the rest is dried. Russia grape production was about 536851 tons produced from area 64300 ha (FAO, 2017).

The propagation of grapes via micro propagation or tissue culture approach has been commercialized around the world. It was applied for selected Vitis genotypes using the culture of intact or fragmented shoot apical meristems, axillary-bud micro cuttings or through adventitious bud formation (Kurmi et al., 2011; Khan et al., 2015).

(HFC) it's a new protective-stimulating humic-fulvate complex, which derived from humified flax shive on its harvest. humic-fulvate complex (HFC), consisting of compounds with a large number of different functional groups: carboxyl, phenolic, amino groups, amide, alcohol, aldehyde, ketone, methoxy, quinone, hydroquinone. (Перминова И. В., 2000).

HFC is characterized by an "auxino-like" effect on plants, that is, they enhance the growth of stems by affecting on the phase of cell stretching, stimulating the growth of cambial structures and correlative growth of all plant organs.

Humic acids (HAs) and fulvic acids (FAs) have direct effects on plant cell membranes. Humic acids (HAs) increase the permeability, ease by which mineral elements move back and forth through the cell membranes, resulting in increased transport of various mineral nutrients to sites of metabolic need. (Robert E.P. 2014).

). Fulvic acid has maximum influence on chemical reactions because of the presence of more electronegative oxygen atoms than any other humate molecules, which enhances membrane. Humic substances provide free radicals to plant cells. Free radicals assist in exerting positive effects on seed germination, root initiation and plant growth in general (Robert E.P. 2014).

The effect of (HS) in the tissue culture was explained by (Dhanapal S. and Sathish Sekar D., 2013) they found that humic acid plays a vital role in the plant tissue culture as a growth hormone for in vitro propagation of many plant seedlings. HAs could improve the growth of eggplant seedlings in tissue cultures at low nutrient levels (1/4 MS) (Obsuwan et al., 2011).

The aim of this experiment is studying the effect of added humic-fulvate complex (HFC) on In vitro rooting of grape cv. 'Khasansky' at the different concentrations (0.1, 1 and 10 ml/L) on improving rooting and vegetative growth.

Material and method. The experiment was carried out in the laboratory of micro clonal reproduction of Russian State Agrarian University - Moscow Timiryazev Agricultural Academy at the early ripening variety of grape (Khasansky).

In this work, ½ MS medium (Murashige & Skoog 1962) was used (as a control) and the new protective-stimulating humic-fulvate complex (HFC) was added at the different concentrations (0.1, 1and 10 ml/ l) in the ½ MS medium.

Shoots were cut into small pieces (1-1.5 cm). These micro cuttings were planted into the jars which filled with 30 ml of the medium and each treatment was replicated three times and each replicate consisted of four pieces of shoots. Then the cultures were incubated in a growth room (20^{+}.2 C), illuminated with1000-2000 lux of light, maintained under a photoperiod of 16 h and data were recorded after 3-4 weeks.

After 3 weeks, rooting percentage (%), number of roots per explant and root length (cm) were recorded. After 4 weeks, rooting percentage (%), number of roots per explant, root length (cm), percent of plants with new growth (%) and length of new growth (cm) were recorded

Statistical analysis. The experimental design consisted of a randomized complete block with four treatments and six replicates. Data were analyzed by SPSS 18 software and comparing averages was done by Duncan's test and a probability value of 5%.

Result and discussion. Data in the table indicated the effect of HFC complex at different concentrations on the rooting growth of (Khasansky) grape after 3 -4 weeks from cultivated.

Good root initiation is very important for in vitro regenerated plants.

Result of these studies indicated that the lowest concentration of HFC at (0.1 ml/l) significantly increased the rooting (%), this increase reached from 8.31(for control) to 37.5% after 3 weeks from cultivated, while after 4 weeks from cultivated, these increasing reached from 9.72% (for control) to 62.5%

Concerning the number of roots per explants, the highest number of roots per explants was observed in the control medium without adding HFC and ½ MS + 0.1 ml/l, respectively.

Regarding the length of the roots, treatment (½MS+HFC 0.1 ml /l) caused the maximum values for root length, these values were (1.20 cm and 1.75 cm) after 3 and 4 weeks from cultivated, respectively.

Total length of root, after 3 weeks from cultivated (½MS+HFC 0.1 ml /l) resulted in increasing the total length of roots than the control and this increasing reached about 303% over the control after 3 weeks from cultivated, while after 4 weeks from cultivated this increases reached about 96% over the control.

Table

Effect of HFC on In vitro rooting of grape cv. 'Khasansky' after three and four weeks from cultivated

Treatment	Rooting (%)	Number of roots per explant	Length of root (cm)	Total length of root (cm)
After 3 weeks from cultivated				
½MS	8.30 B	2.10 A	0.21 B	0.44 B
½MS+HFC 0.1 ml /l	37.50 A	1.50 A	1.20 A	1.80 A
½MS+HFC 1 ml /l	0.00 C	0.00 B	0.00 B	0.00 C
½MS+HFC 10 ml /l	0.00 C	0.00 B	0.00 B	0.00 C
After 4 weeks from cultivated				
½MS	9.72 B	2.50 A	0.83 B	2.08 AB
½MS+HFC 0.1 ml /l	62.5 A	2.20 A	1.75 A	3.85 A
½MS+HFC 1 ml /l	8.33 B	2.00 AB	1.60 A	3.20 A
½MS+HFC 10 ml /l	8.33 B	1.00 B	1.50 A	1.50 B

Means having the same letter (s) within a column is not significantly different at 5% level.

These results are an agreement with (Obsuwan, K. et al.,2000) they found that the root length of eggplant seedlings was significantly increased when grown on ¼MS supplemented with HAs at the concentrations of (25, 50, 75 and 100 ppm). And also, (Aml, R.M. Yousef, et al., 2011) noticed that the HA increased the root length of olive seedlings. (Saruhan et al., 2011 and Kumar Sootahar M. et al., 2019] also suggested that application of fulvic acids (FA) enhances plant growth parameters as well as uptake of mineral elements in a maize crop.

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АКТИНОМИЦЕТЫ ТЕМНО-КАШТАНОВЫХ ПОЧВ В УСЛОВИЯХ ЗАКРЫТОГО ГРУНТА

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***Аннотация:** Общая численность актиномицетов составила 2.8x105КОЕ/г в почве. В почве в стрептомицетном комплексе присутствуют виды из секции Cinereus серии Achromogenes, Chromogenes и секции Imperfectus.*

***Ключевые слова:** почва закрытого грунта, почвенные актиномицеты.*

Актиномицеты – мицелиальные бактерии составляют неотъемлемую часть почвенного микробного комплекса. Пихта сибирская (Abies sibirica) - прекрасное вечнозеленое дерево, реже – стеблющийся кустарник. Она более других сибирских хвойных пород требовательна к эдафическим факторам: нуждается в плодородных и влажных почвах, отсутствует на многолетнемерзлых грунтах [1].

В Монголии Ч. Оюун впервые изучила качественные и посевные показатели семян пихты сибирской [2, 3]. Разработала аллометрическую модель для определения надземной фитомассы и объема ствола пихты сибирской (Abies sibirica), используя показатели высот и диаметров этой породы, растущей в пихтово-смешанных лесах [4].

Цель – исследование актиномицетов темно-каштановой почвы в условиях закрытого грунта.

В работе использовали образцы темно-каштановой почвы закрытого грунта Баянчандмань сомона Центрального аймака.

Семена пихты сибирской (Abies sibirica Ldb), были собраны в лесоэкосистемах (аймак Селенга, сомона Ерөө) и выращены в контейнерах с закрытым грунтом в теплице до 3-летнего возраста, далее в открытом грунте для введения в лесные культуры [1, 2].

Для выделения и дифференцированного учёта общей численности актиномицетов использовали традиционный метод поверхностного посева на казеин-глицериновом агаре. В среду добавляли нистатин (50 мкг/мл) для подавления грибов [5]. Посевы инкубировали в течение 7 суток при температуре 28°С, затем подсчитывали общее число колоний актиномицетов.