CORVINUS UNIVERSITY OF BUDAPEST

Development of media for environmentally sound seedlings

Doctoral Thesis

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The candidate has fulfilled all of assumption of the PhD regulations of the Corvinus University of Budapest, he considered the reflections and suggestions of first official discussion in his revision of dissertation. Because of this the thesis is accepted for the defense process.

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1. Research background and objective

Nowadays the production of vegetable seedling is essential for vegetable growing, in point of fact the farming can not be competitive without them. Accordingly one important assumption of staying competition is to find and develop the right technology. Turning out of good quality is indispensable for thrift and marketability although the cost of production influence for subsequent sale price. In these days rapid increase of fertilizer prices don't help the reduction of costs of production. In addition, in integrated farming we can find a strong effort for mitigation of use of chemical fertilizers and pesticides, respectively utilization of them need to be practical.

The integrated growing prefer the reasonable and predictable farming where the use of chemicals is allowed but that are limited. Thus, the active entity for the purpose of carefully selected, the application for the shortest duration, and the optimal use of the time you place it. It is however necessary to mention that the check is in the rules would be of great importance, which is currently under development. The integrated farming official, agreed by all, and general domestic or international monitoring organizations currently operating in our country does not work. The legislation, however, an important role in the larger integrated producers are joining, based on monitoring of activities and bodies.

Starting from another point of view, seeking to dispense with chemicals for organic farming, it is important that the market does not identify the "organic" is a bad áruminőséggel, or even the desire to achieve, it is necessary that the poor quality (patient, full of pests)-out of the fruits of eco-markets . This is of primary importance, because - although it was initially characterized by a sudden surge - the increase in the magnitude of ecological termesztőterületek now gradually slowed, and even a slight decrease. One reason is probably the market leaders theta back, but another reason for the slowdown in many cases, knowledge of appropriate technology, or lack of existence is that the wealth at the expense of quality and good values.

Organic, organic farming, also known as the nursery should be tailored to two main principles: one is that the plants used in the production medium must comply with the principles of organic farming, namely chemicals, chemical products (fertilizers, disinfectants, herbicides) is excluded, the other to only when the plant protection products allowed in organic farming and biological control methods may be used. The media is necessary, blends one part of the conventional media palántanevelő as possible, since many materials are inherently organic components, which are accepted by the controlling bodies (materials such as: various clean műtrágyamentes Baltic peats, fen peat of clean or pure , chemicals are not pre-treated or mixed with coconut). Despite this, organic nursery has a specific technology (including adequate palántanevelő mixture) has not been developed yet.

In Hungary, the most abundant seedling in peat bog and fen peat used in industrial conditions, they are still under the coconut is widespread. While the slow-peats are classified into renewable sources of organic matter, year after year until the coconut in large quantities as waste material generated. However, the latter mainly from the Far Keletről, that are used by high transport costs is based on the stream.The structural stability of the coir peat peat bog is comparable to the stability, whereas the fen peat at these somewhat weaker. However, these materials do not

contain specific nutrients far, so good "eco-plants' production of organic material mixed with some tápanyagdús to this media. To do this, an obvious opportunity for a variety of plant and animal compost, or even letermett gombakomposzt substances, which are renewable sources of nutrients calculated from year to year. The conventional farms in the műtrágyahasználattal considered as solved in the administration of nutrients, supplementation, which is calculated exactly, and now receptszerűen described and applied to all procedures. In contrast, the nutrient supply in organic farming only organic or clean (without chemicals) mineral materials in advance of the application is complicated by the lack of predictability greatly. It is difficult from year to year to provide the same quality compost, which is exactly the same quantity of nutrients can provide. The more minerals it is possible to calculate the correct nutrient balance, however, these cases do not have all the important nutrients, so it does not help the situation of farmers and researchers.

All these can be stated that the pest kiforratlansága there are several unresolved issues is the "ecological conditions" for growing. My job is to examine whether the animal trágyakomposztok peat and coir-based mixtures can influence the development of palántanövények, their health status, and seedling production time compared to conventional technology.

The two major experiments palántanevelő media (peat and coir) animal (sheep, cattle or horse dung-) komposztokkal mixture with the nursery's role was investigated. Extensive measurements of the experiment, the plants nutritional status and physical properties of the assessment. Hypotheses and used a well-known nursery in walking (control) were compared to the impact of the materials.During the tests, I tried to find the answer to how best to spell out a mixture of the effects of different composts of animal origin, and that is the most appropriate dose trágyakomposzt an advanced kiültethető seedling production. In this way, my goal was to create an acceptable blend palántanevelő, even in organic farming which also allows the production of high quality vegetables.

Hypotheses:

- The experimental mixtures, may be a familiar process – with chemical fertilizers - produced seedlings of similar quality seedlings rearing, planting the plants csírázásától a long period of time.
- Natural materials can be produced from a mixture palántanevelő, which can be adequately tápelemekkel the plants during the seedling.
- The coir, peat bog or peat-based mixtures are considered promising materials for organic vegetables are produced, and the high quality plant material megtermelésében.
- Use of any animal trágyakomposzt vegetables, is effective in improving the education, nutrition help to solve.
- A rapid method to determine the quality of seedlings gives the specific chlorophyll content in SPAD measurement.

2. Materials and methods

Greenhouses and open field experiments suitable nursery seedlings brought up a tray technology. Vegetative three test plants were used. These were as follows: white turnip, eggplant and lettuce.

The experiments for 2 years, the Budapest Corvinus University Experimental Farm and Tangazdaságában done, the heat requirement of the species with a heated, indoor growing facility with foil.

During my down some of the major media in Otta, chemical and physical parameters, while the seedlings These results - in determining the quality - physical and chemical composition were measured indicators.The experimental use of media palántaneveléses after the analysis did not cover the monitoring of seedlings after planting, the plants, my goal was to - if árupalánta production - evaluate the development of plants ready for planting, the seedling should confirm the effectiveness of perspective.

To do this, the nursery sold by the KITE Rt 40x60x6 cm polystyrene trays were carried out. The spring crop in all three experiments, a square prism-shaped, 187 cells cultivated tray. The number of táphengerek 748 pcs / m $^{2)}$ táphenger Size: Æ: 3x3, 30 cm $^{3)}$Experiments only in the autumn lettuce, and turnips were sown in these 96 square-based prismatic cell containing tray (táphengerek Number 400 / m $^{2)}$ táphenger Size: Æ 3.5 cm, 40 cm $^{3)}$ occurred in the education of young plants.The tálcatípusok used for open-grown seedling production is recommended tömegtermesztésre sejtméretnek meet, but the smaller developer root crops (such as an unheated, or mild (5-10 ° C AT) in a film heated forced kohlrabi and lettuce) may be used.

The experiments examined the ability of composted manure provide nutrients, so these treatments were öntözve only pure water. The irrigation water quality data included. In the case of a control treatment that had already been tried and proven mixture were used in the manufacture árupalánta at which műtrágyaoldatos irrigation was performed.

The experiments test plants white turnip (Brassica rupestris convar. Gongyloides 'Wiener Weiss (Vienna white)'), eggplant (Solanum melongena 'purple Kecskemét') and lettuce (Lactuca sativa 'Mehari') were used.

2.1 The experiment used in mixtures

The experiments started at 3, the blending of the following materials were used:

2008th Spring experiment:

- *Novobalt peat:* Slightly acidic pH, light-colored (white peats are also called), fibrous peat bog peat.Before use with a light sifting, and humidification was required. 250 liter containers sold baled.
- *Coir (Neopeat Ltd.):* Disinfected, free of weed seeds, organic matter, 700 to 800% of vízkapacitással, pH value between 6.5 to 7.5 and 0.5 below the value of EC with (PRODUCT NEOPEAT).The pressed bricks after the addition of water soaking trágyakomposzttal mixed with a certain amount spent in the trays.

- *Composted cattle manure:* commercially available composted, dried and sieved szalmamentes szarvasmarhatrágya.Manufacturer: BT VA Me, Székesfehérvár. N: 0.5 to 2.5%, P: 0.5 - 3%; K: 0.3 to 2.7%, also 75-80% dry matter and grain size of 0.1 is characterized by 8mm.
- *Composted birkatrágya:* The origin of the Balmazújváros birkatrágya composted, organic livestock farm.Composting time: 1 year by: prismatic composting.
- *Futor: Takarmánymész* - designed to control the pH of the Baltic peat.The normal, untreated Baltic peat pH has usually 3-4. Previous experiments have shown that liming the pH can be adjusted (Willumsen, 1986). The neutral, or close to neutralizing combustion to achieve pH 3-3,5 kg / m^3

2008th in the autumn experiment:

- *Novobalt peat*
- *Coir (Neopeat Ltd.)*
- *Composted cattle manure: (Me-VA BT)*
- *Horse manure compost:* Origin Soroksár, Peter Major.Conventional-horse stable manure mixed with straw bedding. Composting period is 1 year, way: prismatic composting, soil and szalmatakarással.
- *Futor:* - designed for pH control in the Baltic peat.

2009th Spring experiment:

- Novobalt peat
- Coir *(Neopeat Ltd.)*
- Composted cattle manure *(Me-VA BT)*
- Horse manure compost: Origin Soroksár, Peter Major.
- Futor

2.2 The technology of seedling

The experiments for 2 years, the Budapest Corvinus University Experimental Farm and Tangazdaságában done, the heat requirement of the species in accordance with foil heated indoor growing facility. The wire mesh trays placed faállványzatokra combined, during the heat pipes are provided talpfűtést depending on the weather. The scaffolding also helped to conduct free irrigation water, and avoid legyökeresedés.

The experiments examined the ability of composted manure provide nutrients, so these treatments were öntözve only pure water. The controls used in each experiment, a medium that had already been tried and árupalánta mixture was used to generate. In this case, the well-known and commonly used technology, in addition műtrágyaoldatos fertilization occurred in the seedling. In the medium to low level pre-mixed fertilizer addition had no other food source, so the control plants in the same way in every experiment, a technology that shed their medium. To do this, the nursery has developed, including micro-nutrients, Yara - FERTICARE 14-11-25 100% soluble, crystalline structure, the general microelement fertilizer tápoldatozó Use generally 2 to 2.5 kg / m 3 amount.

The fertilizer plant gardening palántanevelésére all, post-planting nutrient solution departure ing choices to use a concentration of 0.08 to 0.2%.In addition, m the total vegetation foliage fertilizer ikroelemes conditioning, 0.3 to 0.7% töménységgel applicable (Web 6, 2011).

The acidic pH fibrous peat bog peat pH adjustment takarmánymeszet (Futor) were used in quantities of 3 kg/m3.

The trays were placed in a completely random arrangement. 1 tray corresponded to a repetition of the germination of the total counted on plates, seedlings performed the measurements in replicate 10, a tray in the development reflects the well-chosen plants that are above-ground parts (shoot and leaf) have carried out the measurements. The roots of development of the characterization of 5 pieces replicate seedling roots were washed out of the media. *(The list of experiments performed in the marking of the 9th-10th in table.)*

I Experiment *2008. spring*

Used different amounts of composted cattle manure and composted birkatrágya peat bog peat, and mixtures kókuszrostos examined the white turnip and eggplant plants anevelésében Palant.Árupalánta controls the production method used in practice, where I graduated from the fertilizer solution beöntözéssel fertilization.In addition, the peat bog peat and coir effects of control in every experiment has been set for a single treatment, which examined both types of fertilizer for the major component (coir, peat or Baltic) in addition.

II. Experiment *2008. autumn*

Szarvasmarhatrágya composted and composted horse dung in different proportions with peat peat bog, or a mixture of kókuszrosttal examined the white turnip and lettuce plants palántanevelésében. In this experiment - the spring of 2009, pre-trial attempt - the main objective was to test the composted horse dung, to which comparison is sufficient to find the spring experiment were used in the mixtures found to be the best dose of 30% compost + peat bog peat szarvasmarhatrágya and 30 % of doses of a mixture of composted coir szarvasmarhatrágya + application.Composted Horse manure in the spring palántanevelésekhez like 3 different doses mixed with the peat bog peat and coir main ingredients.

III. Experiment: *2009th spring*

Szarvasmarhatrágya composted and composted horse dung in different proportions with peat peat bog, or a mixture of kókuszrosttal examined white turnip, eggplant and lettuce plants palántanevelésében. The lettuce in the autumn experiment, only the mixtures used in 30% (Top Rated) doses were prepared again.

2.3 Measuring, testing

I found the most important nutrient media content, which I was able to conclude their theoretical efficiency.The experimental use of media palántaneveléses after the analysis did not cover the monitoring of seedlings after

planting, the aim was to produce árupalánta, the development of plants ready for planting, evaluate, confirm the effectiveness of the seedling perspective.

The experimental results for the period of seedling and the marketability of plants expressing the most commonly evaluated parameters. The sale "done" above-ground parts of plants size, appearance or marketable hervadékonysága the seedlings is an important aspect.

The hatching rate of speed, the initial (early) shows the vigor of development, and greatly influence the development of uniform and appearance palántaállomány. Healthy, fast-developed root system to ensure adequate eredést, the rapid development after planting, and help to stay in one táphengerek planting.

The above-ground parts of seedlings defining qualities of color, while growing, nutrient supply and plant health factor is an indicator errors. The nutrients taken up by plants may be an important indicator of nutrition, but give the image media in the proportion of nutrients as well. The measurements of these clustered.

The definition of media vízkapacitásának (VK) [%]

Kappel (2006) experiments with different vízkapacitással közegeinél different palántagyökérzet zöldrész-and-mass results obtained. This palántafejlődést taking into account all factors affecting the medium water capacity was investigated.

Seedlings measurements:

- Germination test
- plant height 1: gyökérnyaktól the longest (largest) leaf apex measured height,
- plant height 2: gyökérnyaktól tenyészőcsúcsig the measured height.,
- a fresh seedling (leaves) weight,
- a seedling dry lombtömege,
- a root fresh weight,
- a seedling dry root weight.

The nutritional values of plants for testing

The plants in studies eredények a calculation:

- green parts of dry matter content,
- root dry matter content,
- rate determination of root and green parts,

The seedlings of nitrogen, phosphorus and potassium are defined as:

- N-determination - Kjeldahl method
- P-determination - spectrophotometry
- K-determination - atomadszorpciós lángfotométerrel

Chlorophyll content, SPAD meter to test:

Device: Konica-Minolta SPAD - 502 Chlorophyll Meter, Spectrum Technologies, Inc.

The chlorophyll content of the instrument instrument is able to quickly determine which of the leaf-színtartományából considers the amount of pigment.The SPAD value was about unity. Some experiments using a picture of the plants is nitrogen ellátottságáról.

Statistical evaluations

- The germination rate (the dynamics of germination) (%): The sum of the number of plants germinated per day.
- Two kinds of plant height (cm)
- Shank diameter (mm)
- The seedlings of nitrogen, phosphorus and potassium (mg / kg)
- Green parts of dry matter content (%)
- A fresh seedling (leaves) weight (g)
- A seedling dry (leaves) weight (g)
- Root dry matter content (%)
- 1 root fresh weight (g)
- 1 root dry weight (g)
- From the experimental results obtained by calculation, values, and ratios:
- Roots and green parts ratio: 1 fresh weight of seedling root systems of 1 part of green seedlings (hajtásának) fresh weight.What is greater than this ratio, the greater part of the seedling root system relative to the green.

The statistical evaluations of the Microsoft ® Office Excel 2003, 2007, and the ROPStat statistical programs were used.Help of the calculated results, tables, and charts the settlement was carried out, and this too is a two-factor analysis of variance using the significant correlations between the treatments proved. The treatment of large quantities of data generated in the data ta átlagolatlan ROPStat analyzed using the program.The ROPstat a statistical software package, which is the standard univariate methods under the full repertoire of a rich variety of techniques and offers a robust range of variables in the ordinal analysis can be performed. A special attention is devoted to the ROPstat mintázatfeltáró procedures.

Evaluations of the special attention devoted to the possibilities for grouping and monitoring of trends.

3. Results

3.1 The germination test results

The results of the germination of plants under consideration are presented. The data-recording plus I note that some of the experimental periods, a few days after the last observation was carried out with a re-count in the calculations made after 8-11 days.Therefore, may have occurred to some one or other treatment ismétlésénél nursery was less than one or two of the last recording the occasion, which was related to plant genetic életképtelenségével.In these cases, I met with other notable exception is that the plants in the state after the first leaf szikleveles not developed or deformed.

Overall, the kohlrabi germinate very well, all the experimental period exceeded 90%. In the case of eggplant seedling emergence was slower, but ultimately the 90% rate achieved here is whether the amount of emerged plants.This case did not observe obvious differences in the individual treatments.This is true in the lettuce keléséről too, but this zöldségnövénynél hatching rate was slightly lower in spring 2009, the 30-TM (Novobalt szarvasmarhatrágya peat + compost (30%)) and the 30-TL (Novobalt peat + composted horse dung (30 %)) treatments.

Examining the statistical methods in neither case can be said to have occurred due to the differences in the treatments would have produced.

3.2 The physical properties of plants

3.2.1 The test results of kohlrabi

The turnip plants over a height of two separate methods worked.Thus, it was possible also to determine which method more accurately reveals the palántanövények advanced level. The diagrams of the plant, first of all gyökérnyakától the longest leaf measured peak heights are presented, it can be seen after the breeding gyökérnyaktól measured peak values, followed by presentation of the results of the shank diameter.The shank diameter is important measurement parameter count, since the seedlings fejletségéről give pointers to the height of the plant together with quality indicators.

The 2008 and 2009 are results of experiments in the control plants spring values of k would give a very striking differences.The diagrams in the evaluation concluded that the 2008 spring experiments gyökérnyaktól the tip of the longest leaf plant is measured for the missing 11, 12, 13 as treatment.These KB10, KB20, KB30's treatments *(birkatrágya composted coir + 10%, 20%, 30% of dose).* In these cases, the plants have not evolved from the first letters, so I may have no measurable value. *These plants, however, the total value of the measurement szárátmérőknél:* here observed that the measured values decreased with increased number of treatments, indicating that the *birkatrágya composted coir + 10%, 20%, 30% increase in doses of* inverse change in shank diameter.

The Na^+ and K^+ ions in high concentrations inhibits the growth of crops, which is the formation of roots and green parts can be understood.The atmospheres of nitrogen, phosphorus, potassium and sodium measured parameters of the results shows that the birkatrágya have very high potassium content, which remained at high levels even in mixtures. A mixture of kókuszrosttal case (which also have high potassium content), this value is increased. In addition to the higher concentration of potassium to sodium was also present. Teim experiments thus confirmed the earlier salt stress tests.

The other striking difference between the treatments in the control plants shank diameter and height differences is given in the spring of 2008 and 2009. Be stated here that the tenyészőcsúcsig, the apex of the longest leaf measured height and in proportion to the shank diameter values were higher during the measurements than the other treatments.

Eddigiekkel against the autumn experiment has a more uniform picture of the measured values. This is important to negotiate separately for two periods.

The 2008 and spring 2009 experiments, the first fluctuations in the value-hectic-looking interpretation of the indications point to a system.The stress caused by high salt concentration than the plants in each case a straight percentage increase in size seen in the increasing doses.These lines: 2-3-4 (peat bog peat + composted cattle manure 10-20-30% of dose), 5-6-7 (peat bog peat + composted birkatrágya 10-20-30% dose), 8-9 - 10. (Composted cattle manure, composted coir + 10-20-30% of dose).*The shank diameter of the 11-12-13. (10-20-30 birkatrágya composted coir +% dose) treatment group, interestingly, where decreasing values.* The 14-inch (peat bog + peat + composted cattle manure compost birkatrágya 15-15% dose reduction) and 15 treatments (coconut + + composted cattle manure compost birkatrágya 15-15% dose reduction) of the trágyakomposztok mixing in ascertain the main components (peat bog peat, or coconut) behavior, which trágyakomponensek mistakes, and reinforce értékességüket.The measured values change, it is clear that the mixed kókuszrosttal trágyakomponensek in neither case has been a degree of growth than when the same trágyakeverékek composted peat bog peat formed in the medium.

In the autumn of 2008 trials were not as noticeable differences in the measured, for example, in the shank diameter, in many cases experienced no significant differences (Annex M1/16-os figure). Nevertheless the measured tenyészőcsúcsig növénymagasságoknál two outlier. These are the TM 30 and KM 30's treatments (peat or coir compost marhatrágya + 30% dose). The TM-30 and KM30 as diameter of the shank of the same treatment plants - even compared to other treatments - was higher, which is the better part of infrastructure development refers to green plants.

The tenyészőcsúcsig the longest leaf tip and the measured height values are generally in proportion to each other have changed.This means that higher values were measured with respect to the tenyészőcsúcs, where higher values seen for the longest snail levélcsú measured values.A 1 figure for the 2009 Spring Oak will see the results of

measurements, the columns moving average curve fitted to the proportional change is closely monitored.Observed that in the control plants measured results of the longest leaf tip showed a much greater difference.

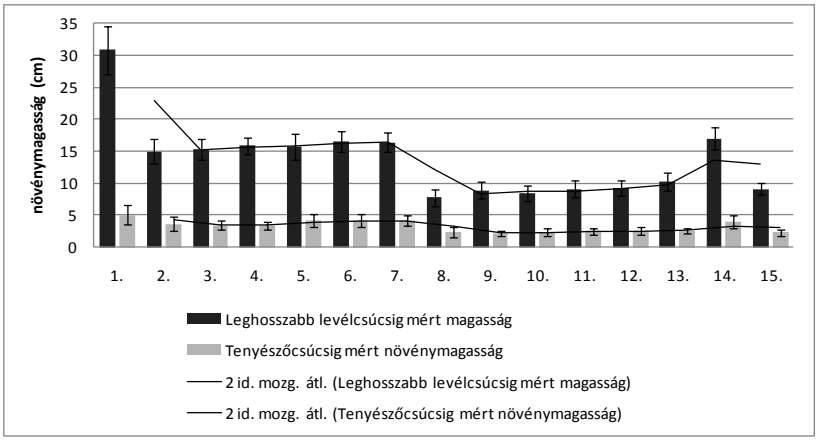

Figure 1. Coherence of plant height measurements - 2009.

Notation: 1 - control, 2 - Baltic peat + composted cow manure (10%), 3 - Baltic peat + composted cow manure (20%), 4 - Baltic peat + composted cow manure (30%), 5 - Baltic peat + composted horse manure (10%), 6 - Baltic peat + composted horse manure (20%), 7 - Baltic peat + composted horse manure (30%), 8 - coco nut fibers + composted cow manure (10%), 9 - coco nut fibers + composted cow manure (20%) 10 - coco nut fibers + composted cow manure (30%), 11 - coco nut fibers + composted horse manure (10%), 12 - coco nut fibers + composted horse manure (20%), 13 - coco nut fibers + composted horse manure (30%), 14 - Baltic peat + composted horse manure + composted cow manure (15-15%), 15 - coco nut fibers + composted horse manure + composted cow manure (15-15%).

The turnip plant in 2008 and 2009 are the results of statistical analysis of plant height and shank diameter of *the* large number of *pairwise comparisons* significant difference in the pairwise comparison of treatments for a variety of doses and the effects of mixture components does not show up correctly.This is because, firstly, that the treatment with doses of intra-group, the treatment groups but also from differences in plant development. At the same time similar and different treatments can be divided into groups, which allows you to get an idea about which treatments are a case of growth-promoting, or inhibiting effect. An example 2 Figure, where the 2008 and 2009 spring shank diameter measurements obtained were compared.Here you will see the difference between birkatrágya and horse dung (the 5-6-7, and 11-12-13 in kezeléscsoport), which meant that the horse dung treatments were generally larger stalk diameter. Since the marhatrágya komposztos treatments (2-3-4 and 8-9-10 treatments) in 2008, slightly higher values were all birkatrágya komposztos treatment, so here's the main difference was the quality of the manure. By contrast, in 2009, from 2 to 7 and 8 to 13 until kezeléscsoportok develops a sharper distinction between which the main components of peat and coir growth demonstrates the effect of its influence.

The tojásgyümölcsnél measured plant height and stalk diameter in the light of the Treatments of the kohlrabi plant is very similar to results seen in tam experience.Műtrágyás received treatment while in the control plants grew up to more than twice as big - so well isolated from the other treatment - while the other changes in treatment doses looking at nearly the same experience can be drawn down. At the highlights növényfajnál Endo, the 2008 Spring Experiment 11, 12, 13 kezeléseinél again as very poor condition characterized by the development of plants (they are coconut + birkatrágya the compost was a mixture of various doses).The 5 plants weeks to just barely reached beyond

the szikleveles state.The tojásgyümölcsnél not, however, experienced increases in inverse proportion to the dose change in shank diameter, but the weakest results in more plants in this treatment group is given.In value due to rising doses in an equally experienced, but this rate is lower. Accentuated by the fact that the joint appearance of two kinds of manure in a peat bog peat also showed better results in the case of mixing, which in 2009 is particularly evident during the spring experiments.

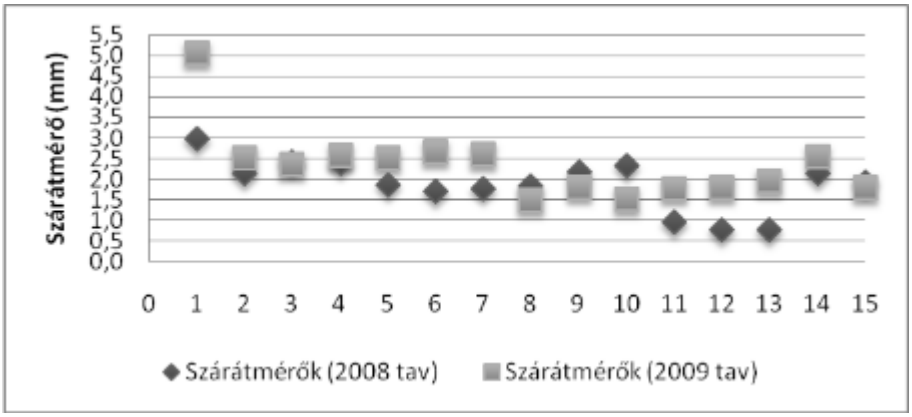

Figure 2. Diameter of stalks on kohlrabi in 2008 - 2009 spring trials

Notation: 1 - control, 2 - Baltic peat + composted cow manure (10%), 3 - Baltic peat + composted cow manure (20%), 4 - Baltic peat + composted cow manure (30%); 5 - 2008 spring: Baltic peat + composted sheep manure (10%), autumn 2008 - 2009 spring: Baltic peat + composted horse manure (10%); 6 - 2008 spring: Baltic peat + composted sheep manure (20%), 2008 autumn - 2009 spring: Baltic peat + composted horse manure (20%); 7 - 2008 spring: Baltic peat + composted sheep manure (30%), 2008 autumn - 2009 spring: Baltic peat + composted horse manure (30%), 8 - coco nut fibers + composted cow manure (10%), 9 - coco nut fibers + composted cow manure (20%), 10 - coco nut fibers + composted cow manure (30%), 11 2008 spring : coco nut fibers + composted sheep manure (10%), 2008 autumn - 2009 spring: coco nut fibers + composted horse manure (10%), 12 2008 spring: coco nut fibers + composted sheep manure (20%), 2008 autumn - 2009 spring: coco nut fibers + composted horse manure (20%), 13 2008 spring: coco nut fibers + composted sheep manure (30%), 2008 autumn - 2009 spring: coco nut fibers + composted horse manure (30%), 14 2008 spring: Baltic peat + composted sheep manure + composted cow manure (15-15%), 2008 autumn - 2009 spring: Baltic peat + composted horse manure + composted cow manure (15-15%), 15 2008 spring: Baltic peat + composted sheep manure + composted cow manure (15-15%), autumn 2008 - 2009 spring: coco nut fibers + composted horse manure + composted cow manure (15-15%).

The statistical analysis re-evaluations of a number of significant pairwise k ülönbséget show.For this reason, the similarities in respect of the following determined: Attachment and M M2/1-es 2/3-as the figure of an eggplant, neither is statistically proven difference between the TB10, TB20, TB30-as treatments (peat bog peat + composted birkatrágya 10 , 20, 30% dose) and KM10 (marhatrágya composted coir + 10% dose) and the GPA 15 (birkatrágya composted coir + 15% + 15% composted marhatrágya doses) between treatments.This is virtually a mirror image of that found in turnip plants. In the 2009 spring trial period measured values of statistical analysis in the same way you should compare the white karalábénál analysis prepared (Annex M2/14, M2/15, M2/16. Fig.). Virtually the same treatment groups show a more or less similar, as in the case of the kohlrabi. The eggplant is not made in autumn seedling.

The measurements of lettuce plants as part of a departure from the two previous measurements carried out, which makes it difficult in some respects the comparison with other plants. Here, shank diameter and gyökérnyak - tenyészőcsúcs distance measurement could not take place.In addition, the experimental setup for this crop has not received any doses of composted marhatrágya, however, were repeated for each dose, double-check the order.In

this regard, must act more closely to the interpretation of symbols as well as in the example számozásoknál will miss the 2-3, and 8-9-treatment.

Between treatments in 2008, the following differences were established in the plant height measured at the tip of the longest leaf: size of the control plants was not very high, in some treatments (eg 4 = peat bog peat + composted szarvasmarhatrágya (30%), peat bog peat + 6 = Horse manure compost (20%), 7 = peat bog peat + composted horse dung (30%) + 13 = composted coir horse dung (30%)) values above it.This spring 2009, just as it tests változott v, as in the case of the kohlrabi.Then the control gave the largest size, then the seedlings raised in peat and coir grown seedlings followed. The autumn and spring nursery has been growing difference Kappel (2006) experiments, where pepper and cucumber plants were also made inquiries.

3.3 The results of tests on chemical composition of plants

3.3.1 The dry matter content of the examination results

The dry weight of the roots and above-ground green parts separate% of the quantities studied. This makes it possible also that the ratio of root and leaf of each plant in the future consideration. Observed that the dry matter of each experimental period are different even in the case, when the treatments were the same mixtures. The kezeléscsoportokat here is the 2-3-4, 5-6-7, 8-9-10, 11-12-13 the number of treatments was made. Within these three groups only the difference was trágyakomposzt doses.

The very low value of the dry matter of control plants in the spring trials. This was mainly due to the kohlrabi (2008-2009's) and lettuce in spring (2009) found the experiment. *During the spring experimental periods, generally, it was observed that the fertilizer treatments komposztos sz.a content is always higher than the value shown in both leaf and root parts compared with the control (plants used for each experiment).* Characteristic for this period was still in the coconut fibers that grown seedlings have higher dry matter content, although their sizes were smaller and less developed compared with seedlings grown in peat.

The Fall of the experiments also showed the inverse of the height of the plants and the evolution of dry matter.In this case, the lower control plants growing higher dry matter were measured, while slightly higher than 4 (TM30 = composted cattle manure, peat bog peat + 30% dose) and 7 (TL30 = Horse manure composted peat bog peat + 30% - dose) treatments for dry matter content was slightly lower. Especially for lettuce in the winter period, I got good results in the composted trágyaféléken grown seedlings, where the palántaméretek vetekedtek all cases the size of the control plants. Here, however, were generally lower in dry matter, which is the inverse effect, both the spring and autumn periods were measured.

3.3.2 Nitrogen, phosphorus, potassium levels in plants

The main nutrients - nitrogen, phosphorus and potassium - examination of the amount accumulated in plants gives some idea of what their organization incorporated tápelemből how much of each plant. Since the initial quantities were measured, it will help some of the deficiency, or figure out the cause of developmental disorders.

The hiring of nitrogen can be seen, first, that of the control plants were able to absorb larger amounts of nitrogen, phosphorus and potassium values, but this trend has not manifested. This is linked to the fact that the nutrient solution when watering the plants ready to receive all the nutrients, which is necessary for optimal development. Top-dressing of the individual experiments in each case gave better result than the 1-2 times a week for fertigation and fertilizer use in the long-lived.

The view that the plants are in *the Spring 2008 experiment,* the 5-6-7 treatment plants (TB10, TB20, TB30 = peat bog peat + composted birkatrágya 10-20-30% of dose) have built an extremely high amount of phosphorus in their organization.During this period, the 11-12-13 in treatments (KB + composted coir birkatrágya 10-20-30 = 10-20-30% of dose) is very weak level of development of the plants were mérhetetlenek. Here, the outliers can be observed in the diagrams.

3.3.3 Results of measurement of chlorophyll content

The results of the measurement of chlorophyll content to illustrate.The chart noted that while the control treatment kohlrabi óan high peak values, while the other plants did not observe such a difference.

Since the pigment content was examined with a device, which is the basis of the color of the plants, so this tool can provide information about any coloring, even the existence of gaps. In many cases, yellowing, seedling towards the end of the course had an effect on the leaves redden felvételezett values.The 2008 and 2009 spring experiments, both the kohlrabi and eggplant plants in the SPAD measurements demonstrated that the leaf and the development of plants similar to the poorer trágyadózisú KM10 and KM20 (composted cattle manure, coir + 10 and 20 % of dose) and TB10, TB20, TB30 Series (Baltic peat + composted birkatrágya 10-20-30% of dose) between treatments.These stages of development were similar in the real world, and the color of the statistically verifiable results *(Attachment: M 1 / 7, M 1 / 20, M 1 / 33, M 2 / 7, M 2 / 20, M 3 / 5, M 3 / 16).*Especially in the Spring 2008 experiment, I received a number of significant differences in the statistical analysis.These plants among the plant height, and shank diameter is roughly similar patterns of differences and similarities, which supports previous statements on.

The turnip's letter was typical of a reddish discoloration of the 2008 + composted coir birkatrágya and to a lesser extent in the peat bog peat + composted birkatrágya treatments. In autumn 2008 and spring 2009, the treatments containing coconut fibers found to a lesser extent reddish leaf coloration. Eggplant for these treatments is stronger yellowing, paler green leaf was characterized by a lettuce leaf size but smaller in the joint application and the pale green color was observed.

The SPAD chlorophyll content was measured for statistical analysis largely confirmed the results shown in the diagrams. Although the spring 2008 experiment, the statistical analysis shows a large number of significant külöbséget, searching for the similarities you may notice that this chart illustrates. The autumn 2008 and spring 2009 periods measured outcomes is much less than the statistically measurable difference, which is due to the horse dung compost and composted cattle manure was similar in nutrition, so the resulting pigment is similarly formed.

One of the most important area of the SPAD values of confirmation of the above ground parts of the comparison of nitrogen values of SPAD chlorophyll content was measured by the number of crops for the 3rd Chart included.These highly visible in the figures, as the nitrogen content and the SPAD values increased in parallel with each other and fall, although the exact exchange between the units is not possible.

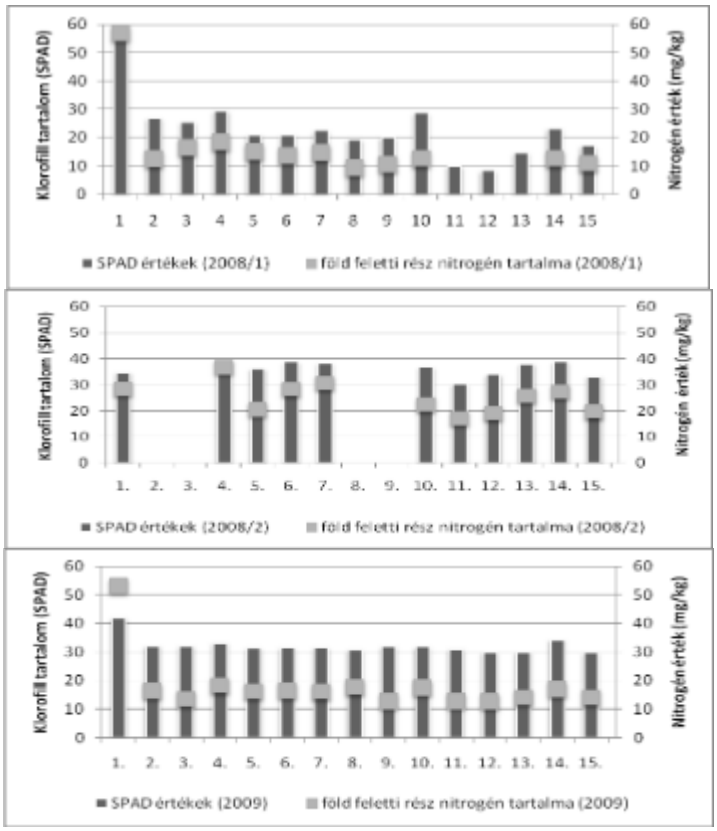

Figure 3.: Measured chlorophyll content in SPAD and the nitrogen levels in the context of the experimental period of three kohlrabi seedlings.

Notation: 1 - control, 2 - Baltic peat + composted cow manure (10%), 3 - Baltic peat + composted cow manure (20%), 4 - Baltic peat + composted cow manure (30%); 5 - 2008 spring: Baltic peat + composted sheep manure (10%), autumn 2008 - 2009 spring: Baltic peat + composted horse manure (10%); 6 - 2008 spring: Baltic peat + composted sheep manure (20%), 2008 autumn - 2009 spring: Baltic peat + composted horse manure (20%); 7 - 2008 spring: Baltic peat + composted sheep manure (30%), 2008 autumn - 2009 spring: Baltic peat + composted horse manure (30%), 8 - coco nut fibers + composted cow manure (10%), 9 - coco nut fibers + composted cow manure (20%), 10 - coco nut fibers + composted cow manure (30%), 11 2008 spring : coco nut fibers + composted sheep manure (10%), 2008 autumn - 2009 spring: coco nut fibers + composted horse manure (10%), 12 2008 spring: coco nut fibers + composted sheep manure (20%), 2008 autumn - 2009 spring: coco nut fibers + composted horse manure (20%), 13 2008 spring: coco nut fibers + composted sheep manure (30%), 2008 autumn - 2009 spring: coco nut fibers + composted horse manure (30%), 14 2008 spring: Baltic peat + composted sheep manure + composted cow manure (15-15%), 2008 autumn - 2009 spring: Baltic peat + composted horse manure + composted cow manure (15-15%), 15 2008 spring: Baltic peat + composted sheep manure + composted cow manure (15-15%), autumn 2008 - 2009 spring: coco nut fibers + composted horse manure + composted cow manure (15-15%).

3.4 Studies of

The analysis of three - in some crucial respects - that I present my results measurement. The first plant height of visible differences in income taxes, which are due to the large amount of treatment were difficult to interpret.The height is reflected in the level of development on the one hand, but on the other hand the weak fényellátottság, suboptimal temperature, or a faulty irrigation resulting from a prolongation of release forms.The shank diameter of the second assessment (which would otherwise be measured very exactly trait), and such a development point of view, the prolongation of the tension between reconstitution.Where larger shank diameter occur, there are not likely due to elongation of the plants are higher plants, but this result indicates their level of development.

The third parameter is a calculated value, the ratio of the root and green parts. This fresh and fresh green root is derived from a ratio of weight. Its value in relation to a nursery gives an average result of treatment. Treatment given here for a larger value indicates greater obturation gre.The result can not be measured in a straight gyökértömegekkel ment of foreign nationals, because if a big green mass is coupled with a large root, it lowers the rate becomes like a little green mass of poor quality, but the share of high gyökértömegű individuals.

The analysis of the values that ranks treatments, and then various doses of interval-cluster, and finally, some important illustration of the value of photographs to help describe the differences between treatments, and the similarities.

4. New scientific results

The students observed the results of the experiment is repeated, based on a number of points supported by each other, these recommendations are the following:

§ I proved that good germination can be achieved trágyakomposztokkal its mixtures with the appropriate mixture of natural materials can be produced.

§ Proved that the experiment used a mixture of peat bog peat mixed with 30% doses of composted cattle or horse dung árupalánta may be suitable for the production of high quality, nutritional characteristics (eg, dry matter content) to reach the raised beds of fertilizer plantlets.The plants look like, however, in most cases is less than the appearance of plants grown with fertilizer, which is the active ingredient of nitrogen solution, some kind of remedy.

§ Proved that the main component used in one of the peat bog peat and coir peat palántanevelő suitable medium, as mixed with peat peat bog in every animal experiment results with vegetables trágyakomposzt better education.The peat bog peat combined trágyakomposztok among the cattle, or mixtures of lótrágyával for improved seedlings are found in them because of nutritionally balanced.

§ The experiments also suggests that the corresponding component of the non-composted birkatrágya green vegetables rearing systems.This is not mixed with other trágyakomposzttal given satisfactory results. The horse and the application of composts szarvasmarhatrágya perspektivikusabb, it is preferable. (A trágyakomposztokkal treated plants, however, in most cases, there was a shortage of nitrogen, although to varying degrees. The minimum rate for (peat bog peat + composted horse or cattle manure) is only a slight yellowing of the cotyledons was observed.)

§ The application of the trágyakomposztok palántanevelésnél nutrients to be expected, especially nitrogénhiánra.The results of the közegvizsgálati nitrogénértékek always been lower than necessary.

§ Confirmed the earlier experiments, the results already reported in literature by others, that the seedling during the high salinity of the organic trágyaszerek dosage-limiting factor.The relatively low nitrogen under high-phosphorus, and potassium salt can cause stress, especially if you do not select a suitable medium for the compilation of the mixture. This eventually can cause problems with water absorption in plants that are drought-induced stress symptoms acting like symptoms (eg, reddening of leaves).

§ In any composted coir + trágyakeverék for műtrágyás, peat bog and peat mixture compared to the results to achieve higher dry matter content is found.

§ Proved by the results of previous foreign literature (egChang - Robinson (2003), adult woody plants in previous attempts to prove to the SPAD value and the correlation of nitrogen deficiency symptoms), and palántanevelésnél our country first, that the SPAD chlorophyll content determined in

view of the plant nitrogen ellátottságáról, therefore, is the SPAD chlorophyll content is set out in finding a suitable addition to the detection of nitrogen deficiency and excess.

- The palántaminőséget SPAD chlorophyll content was measured by examining only partially possible to quickly determine, based on the outcomes from this value can only be inferred from the nitrogen-supply situation.

5. Conclusions and recommendations

The 2008-2009-ies et 3 attempts have been performed using the results of the 4th Chapter I described.During each of these treatments markedly weak results of the experiments small modification was needed.

The quality of the mixtures of all three periods studied, their main nutrient contents. Spring 2008 after the establishment of soil mixtures during the results have been found that mixtures of coir + birkatrágya superseded much potassium content of K_2O content of each agent.

The results obtained by other literary sources, however, correspond to that of cattle manure birkatrágya potassium compared to about a half-written duplicated

During my trágyakomposztos each mixture of phosphorus and potassium are essential nutrients volume was high, and the nitrogen was present in lower quantities.

z proportionately large amount of phosphorus is expected that the nitrogen-supply disruptions occur, therefore - although the higher phosphorus content in root growth, and facilitate the development of the leaves - but have extremely high phosphorus also may inhibit the development of the leaf (it is the obstruction by nitrogénfelvétel) . Consequently, the phosphorous in the leaves will fakóbbak, vörösödhetnek, but might also be a zero phosphorus levélszínváltozás, they become fakóvá.

Overall, the two mixtures tápanyagszintjeit taking into account the expected consequences have expected:

1. the low amount of nitrogen to prevent the ability of plants tápanyagfelvevő (Szabo, 2008),
2. where appropriate, phosphorus and potassium, overdose symptoms may also occur.(Specifically nitrogen supply by the pilot was not based on objective way, because I could not have built in an organic way to be certain that active nitrogen is fed fejtrágyaként.)

Observing the germination rates observed in some mixtures and their changes over time, each of the three experimental periods for the same conclusion: the plants sprouting among the treatments had no significant difference in seeds, 85-95% of hatched, which led to the conclusion that the mixtures, each corresponding to the conditions that are necessary for the germination of plants. This is consistent with the experience of several other researchers (Web 7, 2011 and GEOS et *al.* 2009), while that of the composted trágyaféleségek 80-100% germination rate may hinder the use of money, while others (eg, fen, peat bog or peat, coir etc. .) fluid mixing, the emergence of becoming compliant.

The physical parameters of seedlings (plant height, shank diameter, root and green mass) concluded that the *2008 spring experimental period* for both species of plants under the control of a satisfactory result has been a peat bog peat + composted szarvasmarhatrágya treatments.The most spectacular results in the control peat bog, the peat + composted cattle manure, 30% of therapy given (1 and 4 of treatment).

In the year 2009 for the 2008 year, lagging behind the control height and foliage and plants gyökértömegű me, however, the dry matter content of these plants were better.

The nutritional properties of leaves (chlorophyll content, dry matter content) of each experiment, the obvious difference, which is defined in terms of the SPAD chlorophyll measurements also demonstrated a komposztkeverékekkel treated plants, the leaves were pale green, the cotyledons 4 week, starting with the most palántánál sárgulni began more or less.The symptoms of közegvizsgálati results and NPK plants in underpinning the results clearly indicated nitrogénhiányra. The SPAD values nearly always followed by a decrease in nitrogen levels and growth. The change does not show a linear relationship, but the correlation can be established. The theoretical fundamentals are simple, such as evidence of maize színananyag green (chlorophyll) a positive correlation with nitrogen concentration (Wolfe et *al.* 1989; Wood et *al.* 1992) and in sufficient quantity (Zelich, 1982, Girardin et *al.* 1985). Chang - Robinson (2003), adult woody plants in previous attempts to prove to the SPAD value and the correlation of nitrogen deficiency symptoms, but such experiments in our country (especially in the case of plants, which otherwise is quite significant for the leaf level) there is no data in the literature, this is probably still under such studies have been conducted.

The alakulásánál-leaf plants, it was observed that the coir-based mixtures (where the growth has been slower as well) in the leaves of the kohlrabi fakóbbak, slightly turned red, and the cotyledons become lehulltak yellows. In addition, especially for the 2008 spring and autumn, therefore, there was an attempt for the Petho (1993), Szalai (1994) and Fodor's - Mercenary (1998) is comparable to those described by phosphorous syndrome.This experiment is much greater in the spring occurred in autumn, but only for plants grown in coir, and much more lenient.

Case seems more likely that the low level of nitrogen in the 2008 spring season to the other elements were not able to adequately absorb the plants, and this caused their absence.

The nutritive values of the control plants was generally lower in dry matter and other solids content compared to treatment-grown seedlings, it created an exception for the 2008 winter test period, which was nearly identical to the dry matter of plants.The reason for this change in the circumstances of the search for environmental factors. The autumn period, the intensity decreased continuously, which was accompanied by the increasingly low heat mérsékletekkel, so in some cases there was a prolongation of the treatment received from turnip plants.In addition, the contra shears crop nutrient application for the continued influence of high salinity caused by salt stress eventually, which is caused by thinning of the leaves.

The nitrogen, phosphorus and potassium in the case concluded that the plants are marhatrágya compost were only able to absorb higher quantities of potassium and installed in their organization, if peat peat bog developed in a mixed medium. This phenomenon of the 2008 Fall and 2009 Spring Horse manure composted for the experiment have been reported, although to a lesser extent.

The calculation results obtained by means of the root fejlettségéről-green portion of the root fresh weight ratio of the information given at which it is found that they are greater than their share of green plants developed root system, which evolved kókuszrostos mixture.The kókuszrostos treatments of plants for a higher dry matter content was observed.

In conclusion, the most effective treatments for the compost mucky spring experiments TM30 (peat bog peat + composted cattle manure, 30% dose), and the TL30's (horse dung composted peat bog peat + 30% dose) were marked ezelések k .These composted cattle - or composted horse dung in addition to 70% in peat bog peat was used.In autumn 2008, he wrote two of the above experiment, the treatment with the same z trágyadózisú kókuszrostos counterparts (the KM30 and the KL30's treatment) also showed good results during the seedling.

As the horse dung showed a satisfactory effect both kókuszrosttal, both mixed with peat peat bog in the autumn experiment, this implies further research.It is also recommended to consider also that integrated systems fejtrágyaként (but large intervals) to determine the results achieved by administration of nitrogen. Should not be underestimated because of the growing fertilizer in addition to the cheaper cost of animal origin trágyafélék play any application, and if only one of the nutrients necessary for active kijutattni fertilizer, such cost reductions can be achieved.

Overall, stated that organic farming can be recommended primarily animal trágyakomposztok mixed with peat peat bog provide safe, suitable for seedling medium, which can used as control, műtrágyás seedlings treated with value and quality will also be available.

6. Publications on the subjects of the thesis

Peer-reviewed journal article:

1. Bayoumi, Y.A. - El-Mahrouk,M.E. - El-Aidy,F. - Pap,Z. (2008) Using composts of grape manufacture and farm wastes as growing media in vegetable and ornamental nurseries. International Journal of Horticultural Science. 14(3): 45-50.

2. Geösel,A. - Pap, Z. - Bayoumi,Y.A. - Lestál,G. - Győrfi,J. (2009): Examination of used compost of grown mushroom as media of seedlings. Kertgazdaság, 41(3):3-9

3. Bayoumi,Y.A. - El-Mahrouk,M.E. - El-Aidy,F. - Pap,Z. (2008) Salvage of plant waste in vegetable and ornamental growing based on an Egyptian example. Kertgazdaság, 2008. 40(2):78-88.

Other articles:

1. Pap,Z. (2008): Palántakészítés az ökológiai gazdálkodás elvei szerint. (Seedling production) according to the principles of organic farming.) Zöldségtermesztés, 39(2):8-11.

2. Pap,Z. (2010): Fejes saláta palántanevelése természetes anyagokkal. (Growing of lettuce seedling with natural materials.) Zöldségtermesztés, 41(2):22-26.

3. Z. Pap - Toby A. (2009): Öko-palántanevelés a gyakorlati lehetőségek és a kutatás tükrében. (Practical opportunities and research methods of organic seedling production.) Agrofórum 20(3):112-115.

Proceedings of Conferences (Hungarian language, full paper):

1. Pap, Z. (2008): Különféle komposztkeverékek vizsgálata az ökológiai szemléletű zöldségpalánta-neveléshez. (Examination of various compost-mixes for the organic vegetable seedlings.) The 15th Symposium of Analytical and Environmental Problems. Zoltán Galbács (ed.), Szegedi Akadémiai Bizottság Analitikai és Környezetvédelmi Munkabizottság, Szeged 81-84.

2. Pap,Z. - Némethyné Uzoni, H. - Lovas,M. (2009): A környezettudatos palántanevelés tulajdonságai és optimalizálása a termesztési gyakorlat számára. (Characteristics and optimization of the environmentally sound seedling for the practical growing.) („Mezőgazdaság a változó világban". VIII. Wellmann Oszkár nemzetközi tudományos konferencia 'Plant Sciences and Horticulture Section') – Agrár- és vidékfejlesztési szemle. Hódmezővásárhely, 2009 4(1):55. (full paper in CD)

3. Pap,Z. (2009): Karalábé (Brassica rupestris convar. gongyloides DUCH.) palánták nevelése organikus komposztanyagokkal. (Kohlrabi (Brassica rupestris convar. Gongyloides Duch.) seedling production with organic compost materials.) Erdei Ferenc VI. Tudományos Konferencia, Kecskeméti Főiskola, Kertészeti Főiskolai Kar, Kertészeti szekció, Kecskemét. Ferencz Á. (ed.) Volume II., 301-305.

Proceedings of Conferences (Hungarian language, abstract):

1. Kappel,N. - Pap,Z. - Ferenczy,A. (2007): A közegek fizikai paraméterei és a zöldségpalánták fejlődése közötti összefüggések. Coherences between physical parameters of the media and the development of vegetable seedlings. Lippay János - Ormos Imre - Vas Károly Tudományos Ülésszak, Budapest, 2007. 11) 7-8., Zöldség- és Gombatermesztés szekció, 338.

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1. Pap,Z. - Kappel N. (2009): Physical analyses of substrates for organic seedlings. XVI. Symposium on Analytical and Environmental Problems 28th September 2009.Szeged Zoltan Galbacs (ed.), Szegedi Akadémiai Bizottság Analitikai és Környezetvédelmi Munkabizottsága, Szeged 20-24.

2. Pap,Z. - Kis,K - Slezak,K. - Bayoumi,Y.A. (2010): Growing of some kind of organic seedling on some animal manure composts. 45th Croatian and 5th International Symposium on Agriculture, Faculty of Agriculture, University of Josip Juraj Strossmayer in Osijek, Croatia. Editors in Chief: Marić,S. - Lončarić,Z.) 585-589.

International conferences (abstract)

1. Pap,Z. - Kappel,N. - Terbe,I. (2008): Study of Organic Agents for Ecological Seedlings. 43rd Croatian 3rd International Symposium on Agriculture. University of Zagreb, Faculty of Agriculture, Zagreb, Croatia. (Editor in Chief: M. Pospisil) 144