PoS2-13

Effects of Seed Tuber Size on Yield of Commercially Superior Tuber of Spring Potato in Central Region of Korea

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Abstract: Early harvest of potato (*Solanum tuberosum* L.) is very important to take advantage of high market price and successful cropping system in the central region of Korea. This experiment was carried out at the experimental paddy field of the National Institute of Crop Science in Suwon, Korea. The purpose of this study was to determine the size of potato seed tuber for early harvesting. The seed tuber of 'Soomi' variety was cut into 2~4 pieces each and budded with lagging. Seed tubers were classified into three groups according to weight namely large, medium, and small, with an average weight of 42g, 33g, and 21g, respectively. Each group was sown twice, March 14 for early seeding and March 24 for optimum seeding. They were seeded at 30x60 cm distance after soil mulching with black plastic film. Harvesting was done four (4) times, from June 8 to June 26 at 7-day interval. Plots were laid out in a randomized complete block design with three replicates for each seeding time. The numbers of total tubers and superior tubers were analyzed following analysis of variance with R statistical software. Mean data were compared according to LSD ($P < 0.05$).
The total number of tubers per plant was higher at optimum seeding than early seeding. In optimum seeding, the medium and small size seed tuber produced more tubers weighing over 80g when harvested after June 21, which demands high market price. However, in early seeding, when the temperature is lower than optimum seeding time, the large seed tuber produced more with weight over 80g than medium and small size in all harvest time. Results indicate that large seed tubers over 40g produces commercially superior potatoes in early seeding of spring potato in central region of Korea.

Keywords: Spring Potato, Seed Size, Seeding Time, Harvest Time, Paddy Field, South Korea

PoS2-14

Estimating and Modelling Productivity of Mango Trees from Endogenous Factors. A Methodology Set Up and Validated for African Orchards

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Abstract: In the Niayes region located (Senegal), mango (*Mangifera indica* L.) crop is a main economical income for a variety of farms: from small family farms to large farms based on commercial monocrop orchards. Consequently, farming landscapes are made up of a mosaic of cultivated mango trees displaying strong variability in cultivars and tree structures. As a result, mango productivity is highly variable at different scales (tree, orchard, farm) and this variability has not been quantified and described yet, as in most African regions. Thus, accurate information on mango tree productivity and the endogenous factors that drive its variability is highly needed. The aim of this study was to quantify the production potential of mango trees and estimate it from easily measurable endogenous factors (cultivar, fruit load and structure of the tree). In 2017, a set of 300 trees were sampled to represent the *in situ* heterogeneity in tree structure (height and canopy volume) of the three main cultivars cultivated in the region: 'Kent', 'Keitt' and 'Boucodiékhal' (BDH). At harvest stage, the fruit load – defined by the ratio between the surface of fruit and the surface of the overall canopy – was visually evaluated by 3 experts. Additionally, the number of ripe fruits of each tree was estimated by means of a machine learning algorithm for mango fruit detection from 2 opposite RGB images of each tree. Then, tree productivity (in kg) was obtained using the number of fruits per tree weighted by the average fruit weight for each cultivar. Tree productivity was significantly different between cultivars with a mean productivity ranging from 195.6, 97.4 and 59.7 kg per tree for 'Keitt', 'Kent' and 'BDH', respectively. Images were also used to measure 10 structural variables of the trees such as trunk perimeter, tree height, height and width of canopy and various calculations of canopy volume. We found that for each cultivar, fruit load and all structure variables were highly significant in explaining tree productivity (excepted for fruit load on 'Keitt'). Then, analysis of covariance (ANCOVA) was used to fit the best models to predict tree productivity using the most accurate structure variable. The best model for all 3 cultivars reached a R^2 of 0.69 by taking into account the cultivar, fruit load and the sphere canopy volume variables. Models for 'Keitt', 'Kent' and 'BDH' reached a R^2 of 0.83, 0.76 and 0.71 respectively using fruit load and different structure variables. Finally, we verified our models using a 65 trees validation set on which we manually counted the number of fruits in the field. Therefore, these models allowed for accurate estimate of mango productivity using in field easily-reachable parameters (cultivar, fruit load and structure). They offer new opportunities to estimate variability in yields at the orchard scale and to further identify the parameters that drive this heterogeneity.

Keywords: Mango, Productivity, Yield, Sub-Saharan Africa, Yield Estimation

PoS2-15

Agroeconomic Evaluation of Aromatic and Medicinal Plants Used for Enrichment of Grasslands

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Abstract: For livestock, medicinal plants improve lack of appetite and facilitate the digestive process of animals, boost their immune system and reduce inflammation, grow up milk secretion etc. The aim of this research was to clarify the successfulness of medicinal plants' seeding in pasture. The trial was carried out in sod gleyic soil, pHKCl 5.7, organic matter content 2.1 g kg^{-1}, Latvia, May 2016. The trial was implemented, including two mixtures of seeds. „Country - Horse 2122" mixture contents 9 species of medicinal plants: 7% yarrow (*Achillea millefolium* L.), 18% caraway (*Carum carvi* L.), 20% chicory (*Cichorium intybus* L.), 2% wild carrot (*Daucus carota* L.), 15% fennel (*Foeniculum vulgare* Mill.), 1% hedge bedstraw (*Gallium mollugo* L.), 10% parsley (*Petroselinum sativum* Hoffm.), 10% ribwort plantain (*Plantago lanceolata* L.), 17% salad burnet (*Sanguisorba minor* Scop.). Second mixture contents oregano (*Origanum vulgare* L.) and St. John's wort (*Hypericum perforatum* L.) in equal parts. The seeds were sown in squares, which were free from sward: „Country – Horse 2122" in 8 repetitions and the mixture of oregano and St. John's wort in 7 repetitions. The squares were situated in zig-zag order. In the trial, the influence of the mixture on the growth and development of plants was studied, the changes of botanical composition were established, and the installation costs were calculated. For „Country-Horse 2122", the first sprouts were observed on the 8th day after sowing. For oregano and St. John's wort, the first sprouts were observed on the 21st day after sowing, also in further vegetation plants developed much more slowly. In 2017, the botanical composition of the mixture „Country - Horse 2122" changed to 13% and of the oregano and St. John's wort - to 52%.

Overall, in the squares with oregano and St. John's wort, more than 50% were weeds. The costs of seeds and the manual work for „Country -Horse 2122" trial were 139 EUR per 100 m^2, and for the mixture of oregano and St. John's wort - 208 per 100 m^2. Freshly cut plants were fed to dairy cows: the animals were interested in the eating, also it was observed that the plants' mixture did not change the milk qualities (taste, odour, colour) negatively. The mixture „Country Horse 2122" can be recommended for farmers – it can be sown also mechanized in lines. In this case the costs will be about 250 EUR per ha, but the yield can be cut in the year of sowing. Due to the needs of specific growing conditions, the use of oregano and St. John's wort in grassland may cause problems (the development of the plants is weak in the first year). The price of these seeds also is more expensive than for „Country - Horse 2122" mixture.

Keywords: Grassland, Pasture, Medicinal Plants, Mixture

PoS2-16

Root Depth of Field Crops and Vegetables in the Czech Republic

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Abstract:
Introduction: The size and depth of crop roots are plant traits important for effective utilization of nutrients and water from soil. The role of roots in tolerance of or adaptation to unfavourable abiotic conditions is widely recognized. Data on root size are important for reliable estimation of water and nitrogen supply available to crops (Haberle, Svoboda 2015).

However, there is persisting shortage of reliable root data as root excavation to maximum root depth, root separating and length measurement are laborious and time consuming activities. To provide data on root depth results from root investigations performed by authors in past years were summoned.

Methods: Soil with roots was sampled with hand held soil corer in 10 cm segments, 10-20 cm under the zone where last, the youngest and turgid roots were visible. Roots were sampled on the term of expected maximum depth, mostly after flowering, at vegetables before harvest. Roots were washed with water and separated on sieves, cleaned and root length was manually calculated according Tennant (1975). The data from different years and sites are presented as length density distribution in a soil profile. The cases with minimum and maximum depth and density are presented. Effective root depths of crops are calculated, assuming density of 1 cm or 0.5 $cm.cm^{-3}$ as tentative limits of significant depletion of sources from sparsely rooted subsoil layers.

Discussion: Except for specific unfavourable soil conditions the root depth of specific species was relatively stable or the impact of soil conditions predictable. For example, wheat showed by 20-30 cm lower rooting depth at sites with sandy loam top soil and loamy sand subsoil (Cambisols) in comparison with loamy and clay loamy soils (Chernozem, Luvisols). Root depths generally corresponded to literature data and it enabled to specify groups of crops with similar extent of root zone for the use in farm praxis. Examples of the effect of zero, reduced and conventional tillage or localised placement of fertilizers on root distribution are presented. Examination showed modification of root density distribution, with compensation growth, as the result of the practices.

Apparent depletion of mineral nitrogen and water from subsoil was estimated in the experiments, as the difference between early spring distribution of available water and nitrogen in comparison with profile data at or after peak of demand. Generally, maximum root depth indicated reasonably depletion zone when top soil available sources were exhausted and under conditions of great plant demand for water and N. The root data were used by the authors for development of programs for estimation of depletion of available water supply and water stress onset during crop growth, for estimation of available nitrogen in subsoil and calculation the risk of nitrate leaching from root zone.

Keywords: Root System, Effective Root Depth, Water Supply, Nitrogen Depletion

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PoS2-17

Field Emergence and Root Yield of Sugar Beet in Relation to Seed Priming

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Abstract: In comparison with other species of agricultural plants, high quality of seeds is an essential factor determining the production and economic success of sugar beet cultivation. Seeds of good quality guarantee high, fast and steady emergence and largely determine the plant growth, development and yield. The quality assessment of sugar beet seeds is based mainly on biological properties, which are a consequence of a group of traits and factors resulting from their anatomical and morphological structure as well as conditions during germination and emergence.

The aim of the study was to evaluate the impact of primed and non-primed seeds of the same cultivar on the course of field emergence (size, emergence rate and emergence uniformity) and the root yield and its components of sugar beet.

In the years 2012-2014, a field experiment with sugar beet was carried out in the experimental field of the Department of Agronomy at the Faculty Experimental Station of the Faculty of Agriculture and Biology of Warsaw University of Life Sciences - SGGW in Warsaw, located at Skierniewice in central region of Poland.

The study was performed in a one-factor experiment established in 4 replications. The experimental factor was diversified seed material of the same cultivar of sugar beet (typical seeds, traditionally prepared for sowing (non-primed seeds) and seeds before sowing, subjected to the process of priming. The total number of plots was 8. Each plot included 6 rows with a length of 16 m and an area of 43.2 m^2. External rows on plots 1 and 6 and 0.5-meter edge strips on each plot were assumed as a protective belt. The area to be harvested was 21.6 m^2. Data concerning the emergence of individual plants allowed the calculation of the field emergence (FE) as well as emergence rate and uniformity. During the harvest, the roots from each plot were counted and weighed. On this basis, plant density, mean root mass and root yield as well as its structure from the plot were obtained.

The sugar beet emergence on plots with primed seeds was faster, more even and uniform. The emergence rate as well as its uniformity in the combination with primed seeds were significantly higher in 2012 and

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ABSTRACT BOOK

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