Rare sugars are defined as monosaccharides that are rare in nature and their derivatives. There are only a few reports of elicitor activity by rare sugars, which is able to induce the disease resistance by gene analysis. The purpose of this investigation was to define the merit of agricultural use, when rare sugars ware able to use as fertilizer in hydroponics. In this experience, the effects of rare sugars on growth and disease occurrence in head lettuce solution culture. It was suggested that D-psicose and D-allose were able to use as plant growth regulator in hydroponics. and growth and development of head lettuce in hydroponics depended on the concentrations of D-psicose or D-allose. Furthermore D-psicose and D-allose induced disease resistance in head lettuce, and had repression effect of disease occurrence.

## Sm04.219

### pH-Management in Substrates during Cultivation of Pot Plants - A Review

**Neumaier, D., Lohr, D.; Meinken, E.**

STAATLICHE FORSCHUNGSANSTALT FÜR GARTENBAU WEIHENSTEPHAN, AM STAUDENGARTEN 14, 85354, FREISING, GERMANY

Unwanted pH-drift during cultivation can cause a plenty of nutritional problems. Decreasing as well as increasing pH-values boost the risk of different micronutrient deficiencies or toxicities respectively. There are different options but also limits for managing the substrate-pH in a suitable range: - Substrate choice and liming Different substrate components (e.g. composted bark) can stabilize pH effective. On the other hand some components like wood fibre cause raising pH-values. Furthermore the amount and especially the graining of used limestone is a major factor for pH-development. - Nitrogen-form With the ammonium/nitrate-ratio the substrate-pH can be influenced in both directions, but only with a low and short-time impact. Fertilizers high in ammonium have an acidifying effect and cause substrate pH to decrease and the opposite is true for fertilizers high in nitrate. - Irrigation water quality Weak water with low hardness decreases while water with high hardness increases substrate-pH. Blending rain and tap water or technical water preparation may prevent problems. - Limestone suspension A donation of limestone suspension increases pH rapidly. However, the intensity of the effect is not predictable and layers with different pH-values may occur. - Sulphur suspension In contrast to limestone elemental sulphur can decrease pH with a good short-term effect. But the impact also is not predictable and may cause pH-layers. - Caustic potash or potassium bicarbonate Both chemicals lead to a quick and heavy pH rise when applied in aqueous solution. Problematic here is the high potassium input. - Fe- and Al-sulphate Theoretical pH may be lowered by using Fe- or Al-sulphate, but the remarkable high Fe- or Al-input is very risky. Most of the options act with retardation and their impact is not predictable. So preventing pH-changes by an exact crop planning, continuous pH-controls and sophisticated cultural measures is the best way to avoid problems.

## Sm04.220

### Evaluation of Organic Substrates for Noni (*Morinda citrifolia*) Seedlings Production

**Sousa, J. A.[1]; Silva Neto, P. A. F. S.[2]; Ferreira, F. V. M.[2]; Araújo, D. B.[2]; Sousa, J. C. R.[1]; Silva, T. C.[2]; Bezerra, F. C.[1]**

[1]EMBRAPA TROPICAL AGRICULTURE, 2270, DRA. SARA MESQUITA STR., 60511-110, FORTALEZA, CEARÁ, BRAZIL

[2]FEDERAL UNIVERSITY OF CEARÁ STATE, MR. HULL AVE., 60.021-970, FORTALEZA, CEARÁ, BRAZIL

Despite the great success and international demand for noni (*Morinda citrifolia*) products due to its medicinal properties, in Brazil there is limited research been done with this specie. The scarce information concerning the traits is one of the gaps to establish a production system for this plant. In this sense, the present study aimed to define the best substrate, formulated on the basis of regional organic waste for production of noni seedlings. The experiment was conducted at Embrapa Tropical Agriculture experimental farm - Pacajús, from 03/03 to 07/07/2009, in greenhouses, with 50% shade and irrigated by hand in 175 ml tubes. Ten substrates were formulated based on local organic wastes and a commercial substrate (control). The experimental design was completely randomized with eleven treatments and four replications, each plot consisting of ten seedlings. Plant height, number of leaves, stem diameter, fresh and dry weight of shoot, fresh and dry weight of roots, vigor, uniformity and color were evaluated. For the last three variables, the evaluation was done by a grading system of 1 to 5 (1 being the worst and 5 the highest rating), assigned by three independent assessors. There was a statistically significant difference in all variables (F test). A significant difference for all variables was detected, and the highest values were observed for substrates S2 and S5. Therefore, the compounds based on crop residues and animal manure, combined with coconut husk powder, has a great potential to become an alternative for noni seedlings production. Substrates with best results for noni seedlings production were: S2 = compound 1 [+ CEASA remains of fresh cattle manure (3:1)] + coconut powder (1:2, v / v) and S5 = compound 2 [+ CEASA remains of poultry litter (3:1)] + coconut powder (1:2, v / v).

## Sm04.221

### Growth Evaluation of Rose cv. Charlotte Grown on Substrates with Drainage Recycling

**Villarreal-España, J. D.; Rodríguez-Morales, A. A.; Flórez-Roncancio, V. J.**

NATIONAL UNIVERSITY OF COLOMBIA, A.A. 14490, 11001000, BOGOTÁ, CUNDINAMARCA, COLOMBIA

Inefficient and unsustainable use of water in export flower crops has become a general problem in the Bogota Plateau. For this reason, the implementation of drainage collecting and recycling systems has come up as a feasible alternative. In addition, the use of substrates has become a viable option for managing soil physical and chemical limitations in the region. The objective of the present research is therefore to assess the effect of drainage recycling systems on the growth of rose cv. Charlotte flowering stems cultivated in different soils and substrates. The plants, grafted on Natal Brier rootstocks were cultivated in greenhouse at a 6.5 plant/$m^2$ density under greenhouse conditions. The substrates used were 100% burned rice husk, 65% burned rice husk - 35% coconut fiber, and 35% burned rice husk - 65% coconut fiber; and the recirculation percentages were 0%, 50% and 100%. A completely randomized split-plot design with three repetitions was applied. The main plots corresponded to the recirculation percentages, the sub-plots to the substrates, and the experimental unit to the 12$m^2$ bed (15m × 0.8m). Additionally, treatments consisting in only soil and 100% coconut fiber were also included. Number of leaves, stem length and diameter, and flower head length and diameter were assessed through continuous sampling. The growth curves generated from these observations were adjusted to a polynomial growth model.

## Sm04.222

### Design and Development of an Automatic Drainage Recycling System for Cut Flower Crops in Colombia

**Cuervo-Bejarano, W. J.; Flórez-Roncancio, V. J.; González-Murillo, C. A.**

NATIONAL UNIVERSITY OF COLOMBIA, A.A., 14490, 11001000, BOGOTÁ, CUNDINAMARCA, COLOMBIA

The economic importance of the cut flower industry in Colombia is well known. During the last six years an effort among different institutions have been done in order to develop the cut flower physical infrastructure. One of the first steps taken by the working group was to design and set up a complete automatic system to recycling the cut flower fertilizer solution. The complete automatic recycling system was designed and built for cut roses and carnation crops. This system embraces different stages and electronic devices. The automatized system has the following steps: Drainage collection, measurement, variables reading, storage and fertigation of nutrient solution for different treatments. To carry out this process was developed an application in LabVIEW®. The system includes the development of new technology such as continuous real time acoustic level measurements, as well as the electronic control built to run the pumps, valves, and to read the information provided by EC, pH, $NO_3$, Na, Cl, Ca and K sensors. The system acquires real time information from temperature, relative humidity, PAR and global radiation climatic sensors. It provides daily and hourly basis information. This new development will be of a great help for future research in the improvement and adjustment of more accurate nutrient solution to be used at commercial level. Finally, it is expected that the achievement of an automatic drainage recycling system will decrease the environmental impacts produced by pouring out saline solutions to the Bogotá plateau agro-ecosystem.