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VOLUME II



RIO18

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PROCEEDINGS
of the 21st WORLD CONGRESS OF SOIL SCIENCE
Rio de Janeiro, August 12-17, 2018 BRAZIL

SOIL SCIENCE
Beyond Food and Fuel



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21st World Congress
of Soil Science

Rio de Janeiro August | 12 - 17

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proportions of their total P in the subsuperficial horizons. The inorganic P dominates over organic P in all the soil horizons being over 55% in all the soils. The soil series varied their relative P accumulation according to their permanent features related to P retention capacity. Independent of their total P the Hueicoya soil (with low retention capacity) presented the greatest proportion of its P in the labile P fractions (Resin and bicarbonate) compared to the other soils which accumulated their P in their moderately labile fractions (NaOH and HCl 1M).

Keywords: P sequential fractions; total P, inorganic P, organic P, genetic soil evolution

Financial support: Instituto de Ingeniería Agraria y Suelos (UACH).

(1704 - 580) Phosphorus organic forms release in long term field experiment depending on maize fertilization and growing systems

Stanko Milić¹; Jordana Ninkov¹; Jovica Vasina¹; Živanov Milorad¹; Jelena Marinković¹; Branka Žarković²

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Since phosphorus is a non-renewable resource and one of the main pillars of modern agriculture the majority of global studies are directed toward more efficient use of phosphorus fertilizers, its recycling, and the use of alternative sources. Soil samples for the study were taken from long-term trial of the Institute of Field and Vegetable Crops at the experimental station at Rimski Šančevi. The trial was set up in 1965 as two-factorial, and replicated four times, according to the plan of divided plots (split-plot design with randomized variants). This study is based on monitoring the effect of crop rotation and fertilizers (manure, harvest residues and mineral fertilizers) on the presence of phosphorus and its organic fractions in different layers of rhizosphere by long-term use of particular maize growing and fertilization systems. The following factors were analysed: 1. Fertilizing systems: single-crop system (Ø, NPK, NPK+maize remains, NPK+manure) and two-crop rotation – maize/barley (manure, NPK+manure); 2. Soil depth: 0-20 cm; 20-40 cm; 40-60 cm. Chemical parameters, which was monitored on 324 number of soil samples, during the this investigating period was: basic chemical characteristics of soil, content of total phosphorus, content of total organic phosphorus, fractionation of organic phosphorus, activity of acid and alkaline phosphatase and yield. Organic matter content ranges from 1.88% to 2.98%. The highest values are characteristic for the treatments where manure was included together with mineral fertilizer. The highest content of total and organic phosphorus was found in the treatments with manure application, increase ranging from 27% to 70% depending of the variant. Characterisation of different types of organic phosphorus (labile, moderately labile, nonlabile) showed clear demarcation among studied treatments. Significant differences in all studied fractions and depths divided two basic groups, with and without use of organic fertilizers, wherein the highest values were actually found in the treatments with manure application. This was also proved by achieved statistical significances of LSD test between analysed components. In the year of the study, as well as for the long-term period, the lowest yields were achieved in the control variant of maize cultivation in single-crop system. Treatment two-crop rotation NPK+manure has statistically significantly highest yield comparing to all investigated variants.

Keywords: phosphorus; maize; calcic chernozem; phosphorus organic fractions; long term experiment

Financial support:

(5303 - 2335) Potential reduction of fertilizer application in paddy soils: Nutrient reserve approach from soil mineralogical composition in Indonesia

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Indonesian Agency for Agricultural Research and Development¹

Paddy soils occupied about 155 million ha of the world land surfaces and about 144 countries grow rice as the crucial source of food. The strategic approach to promote high yield, efficient use of fertilizer, environmentally sound and sustainable rice production in rice cultivation area worldwide is crucially required. The objectives of the study were (i) to evaluate easily weatherable minerals as natural nutrient reserves in various paddy soils developed from different parent materials in Indonesia, and (ii) to relate nutrient reserve-minerals with availability of soil K-nutrient as management strategy to omit or reduce K fertilizer rate without loss of rice yield. In this study, the soils were selected to represent paddy soils derived from volcanic, alluvial, and sediment materials at four main islands of Indonesia. Soils were sampled from each layer of soil profiles to determine easily weatherable and resistant minerals using a polarization microscope and to analyze various available nutrients. Results showed that soils deriving from acid volcanic material (rhyolite, Sumatera island) and intermediate sediment parent material (marl tuff, claystone and karst, Sulawesi island) contain high sanidine (25-42%) and biotite minerals, corresponding to high status of available K in whole soil profile layers. In addition, soils derived from brownish dark tuffaceous pumice and andesitic materials in Sumbawa Island also contain high status of available K due to K trapping in pumice structure during volcanic eruption. All those soil available K-derived parent materials (not from fertilizer) were more than enough to meet rice requirement, hence K-fertilizer could be omitted. For soils derived from alluvium materials (consisting of mainly quartz minerals, 74-80% in Java island), the available soil K was very low ($< 0.1 \text{ cmol}_c \text{ kg}^{-1}$). This indicates rice crop could experience severe K nutrient deficiency, hence high rate of KCl fertilizer should be applied as a management strategy to satisfy rice requirement. Implication of the study is the ignorance of naturally available K derived from K-bearing minerals in current management practices of paddy soils worldwide has led to wasting fertilizer and environmental pollution in soils containing high K-bearing minerals. Hence, the strategy should be made to apply fertilizer in paddy soils on mineral based composition to effectively reduce chemical fertilizer, cost and pollution and to sustain rice yield production.

Keywords: Paddy soils; fertilizer efficiency; soil minerals; rice yield

Financial support: Indonesian Agency for Agricultural Research and Development

(3997 - 980) Production and quality of 'Syrah' grapes fertigated with nitrogen and potassium

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Viticulture is an activity of great social and economic importance in the Lower Middle São Francisco region. The soils cultivated with grapevine in this region are poor in organic matter content, presenting in general low natural fertility. Thus, nitrogen and potassium fertilization generally have a great impact on the production and