

Effect of organic and inorganic amendments on abatement of industrially polluted soils grown with castor crop

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ABSTRACT

A study on "Effect of organic and inorganic amendments on abatement of industrially polluted soils grown with castor crop" was conducted at College of Agriculture, Rajendranagar, Hyderabad for evaluating the amendments to abate the polluted soils. The results revealed that in Isnapur soils, highest castor dry matter yield was observed in treatment applied with the application of RDF (NPK) + 5t VC ha⁻¹ (41.80 g pot⁻¹), whereas in Katedan soils, highest dry matter was observed with N and K (RDF) + 60 kg P₂O₅ ha⁻¹. Among the treatments highest N and K contents were observed in castor crop grown on Isnapur polluted soil with the treatment of RDF (NPK) + 5 t VC ha⁻¹, whereas P content was highest in treatment with the application of 100 kg P₂O₅ ha⁻¹ along with N and K as RDF. The Cd, Ni, Cr and Pb contents were decreased with the application of phosphorus, vermicompost and CaCO₃. Application of 5% CaCO₃ along with RDF showed significant reduction in contents over other treatments.

Key words : Polluted soils, Amendments, Heavy metals, Micronutrients, Castor

In India, due to rapid industrial development during the last two decades, disposal of industrial effluents has become a serious problem. As a result, application of industrial effluents to land became popular in the recent past as an alternative means of treatment and disposal (Chhonkar *et al.*, 2000). Besides being a useful source of plant nutrients, these effluents often contain high amounts of various organic and inorganic materials as well as heavy metals, depending upon the industry from which these are originating. The unscientific disposal of untreated or under-treated effluents has resulted in accumulation of heavy metals in soil, crops and water bodies. The heavy metals accumulating in soils may get entry into the human and animal food chain through the crops grown on it. The heavy metal contaminated soils can be remediated through two contrasting approaches *i.e.*, pollutant stabilization and phyto decontamination. Therefore, more logical and scientific methods like immobilizing the pollutant metals in soil by using chemical amendments can be one of the approaches. Keeping this in view, an investigation was carried out on "Effect of organic and inorganic amendments on abatement of industrially polluted soils" when grown with castor crop.

MATERIALS AND METHODS

A survey was conducted on agricultural soils continuously irrigated with industrial effluents in and around Isnapur tank and Noormohammad tank and 25 surface samples were collected from each area. Out of

these samples bulk surface samples having highest toxic metal contents (one each from Isnapur and Katedan tank area) were collected and used for pot culture experiment at College of Agriculture, Rajendranagar, Hyderabad to study the efficacy of amendments like single super phosphate, vermicompost and lime on two different polluted soils collected from these two industrial areas. Bulk surface samples having highest polluted elements (one from Isnapur and one from Katedan) were collected, air dried in shade and were pounded to pass through 2 mm sieve. The soil was filled at the rate 5 kg plastic bucket (5 kg capacity). The following treatments were applied with four replications and the data were analysed using completely randomized design (CRD). The test crop used in this experiment was castor (cv. KRANTHI). The treatments were T₁: Control, T₂: NPK (RDF), T₃: N and K (RDF) + 20 kg of P₂O₅ (SSP), T₄: N and K (RDF) + 40 kg of P₂O₅ (SSP), T₅: N and K (RDF) + 60 kg of P₂O₅ (SSP), T₆: N and K (RDF) + 80 kg of P₂O₅ (SSP), T₇: N and K (RDF) + 100 kg of P₂O₅ (SSP), T₈: NPK (RDF) + VC (5 t ha⁻¹) and T₉: NPK (RDF) + CaCO₃ (5%). The recommended dose of fertilizer applied was 60 kg N: 35 kg P₂O₅: 30 kg K₂O.

The plants were harvested with a stainless steel scissors up to the base, above the soil. Initially, the samples were washed followed by sun drying and subsequently they were oven dried at 70°C to constant weight and dry weight was recorded. The plant samples were grounded to fine powder and preserved carefully for analysis. Finely