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Book Review

Nutrient Uptake Removal & Recycling by Crops by H.L.S. Tandon and Y. Muralidharudu (2017), Fertiliser Development and Consultation Organisation, New Delhi, India, pp. 167+xvi, price Rs. 600 (in India) and US$ 60 (outside India), ISBN: 81-85116-61-X

The nutrients, both macro and micronutrients, are continuously mined from soil through crop removals. Therefore, it is necessary to replace the quantities of nutrients removed from soil by addition through fertilizers or organic manures or recycling crop residues for improving soil health and sustainable crop production. The extent of removal of nutrients varies differentially with types of crops and varieties, nature of soil types, fertility status of soils, and other properties and conditions of soils. It is also known that crops absorb and remove all plant nutrients during their lifespan. Therefore, information on the amounts of nutrients absorbed or taken up by different crops is of practical importance. This research-based handbook or compendium is one of the very few publications devoted exclusively to nutrient uptake, removal and recycling by crops.

This compilation has fifteen chapters including references. Chapter 0 provides a brief account on the importance and scope of plant nutrients and issues concerning nutrient uptake and removal by plants. Details of nutrient uptake, removal and recycling by cereals *viz*., rice, wheat, barley and maize; and millets *viz*., pearl millet, sorghum and finger millet have been discussed in chapter 1. Chapter 2 describes the nutrient uptake, removal and recycling by pulses namely, chickpea, pigeon pea/tur/arhar, lentil, green gram/moong, black gram/urid, cowpea, field pea, horse gram and green beans/French beans. Chapter 3 deals with oil yielding crops *viz*., castor, coconut, groundnut/peanut, linseed/flax, niger, oil palm, olive oil, rapeseed-mustard, safflower, sesame/till, soybean and sunflower. Chapter 4 gives a brief account on nutrient uptake and removal by tuber and root crops namely, potato, cassava/tapioca, sweet potato, yams and arrow root. Chapter 5 describes the nutrient uptake and removal by fruit and nut crops like apple, arecanut, avocado, banana, cashew nut, citrus fruits including mandarins, lemon, kinnow, grapes, guava, hazelnut, ber/Indian jujube, kiwi fruit, macadamia, mango, olive, papaya, passion fruit, pecan, pineapple, pistachio, rambutan, sapota/chiku, strawberry, walnut and water melon.

Nutrient uptake and removal by vegetable crops are discussed in chapter 6. The important crops discussed here are asparagus, beans, bottle gourd, brinjal/egg plant, broccoli, brussel sprouts, cabbage, carrot, cauliflower, celery, Chinese cabbage, cucumber, kolrabi/knolkhol/German turnip, lettuce, okra/ladies finger, onion, peas, pepper, pumpkin, radish, snake gourd, spinach, swede/rutabaga, sweet corn, tomato and turnip. Chapter 7 elaborates the nutrient uptake and removal by sugar crops namely, sugarcane and sugarbeet. While, chapter 8 describes the nutrient uptake and removal by fibre crops like cotton, hemp, jute and sisal; and chapter 9 deals with stimulants crops *viz*., chicory, cocoa, coffee, hops, tea and tobacco. Fodder crops, forage crops and grasslands/pastures are discussed in chapter 10. where details on leguminous forages/fodders *viz*., alfalfa/ lucern, cluster bean, cowpea fodder, berseem, lablab bean; and non-leguminous fodders *viz*., beet fodder, Congo signal grass/ruzi grass, Deenanath grass, guinea grass, maize fodder, napier grass/elephant grass, napier-pearl millet hybrid, oats, pangola grass/digiteria, pearl millet, setaria, signal grass, sorghum and tropical grasses are discussed.

Chapter 11 gives a brief account on nutrient uptake and removal by spices and crops used for flavouring/ garnishing. The crops included are black pepper, cardamom, coriander, cumin, fennel, fenugreek/methi, garlic, ginger, leek, turmeric and unum/ajwain/bishop's weed. Medicinal and aromatic plants are dealt in chapter 12. The important crops discussed are chamomile, davana, dill, duboisia myoporoides/cork wood, isabgol/psyllium, Japanese mint, Java citronella, lemon grass, opium poppy, palmarosa oil grass, periwinkle, pyrethrum, rose geranium, sweet flag and white musli. Chapter 13 describes the nutrient uptake and removal by other crops including industrial crops like cluster bean/guar, mulberry and rubber. While chapter 14 deals with nutrient uptake and removal by forest trees *viz*., acacia/babool/black wattel, eucalyptus, gamellia/beechwood, pine, poplar, sal and teak. The last chapter includes references, appendices, acronyms and units and conversion factors.

This compilation summarizes a number of results on nutrient uptake by crops which have been generated by the centers of ICAR's coordinated research project on soil test crop response correlation. Authors have compiled this practically useful handbook with their long experiences in the field of soil fertility, nutrient mining and fertilizer use. This book has been written for a diverse readership, including agronomic/market development staff of the fertilizer industries, students, researchers, teachers, soil-plant-fertilizer testing laboratories, technology transfer centers including training centers and KVKs, independent consultants, advisors and technical personnel of the department of agriculture and horticulture. Overall, this is a very useful and practical compilation dealing with nutrient mining through crop removal and will be useful to all those associated with nutrient management while planning future research work.

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