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MOISTURE CONTENT AND EXCHANGEABLE MANGANESE STATUS OF LATERITIC AND MEDIUM BLACK SOILS

Soil undergoes changes in its moisture contents from season to season as well as from day to day in the same season affecting the availability of the various plant nutrients in the soil. Manganese is one of the most sensitive among the micrountrients to change in moisture content due to its different valency states. Laboratory studies were, therefore, undertaken to assess the availability of native as well as applied Mn under different moisture conditions in two important types of soils viz., lateritic soil with a pH of 5.6 and medium black calcareous soil with a pH of 7.4.

Five hundred gram of these soils were brought to *(a)* moisture equivalent in glass containers. These were than subjected to different cycles of hydration and dehydration. The two soils were maintained at moisture equivalent in the first cycle and at twice the moisture equivalent in the second **cycle** for **a** period of 50 days. Exchangeable Mn was determined at intervals of 10 days in both the cycles. In the third cycle, soils were kept at moisture equivalent for one week and after which it was oven-dried These soils were rewetted, kept for one week and again oven-dried and the process repeated a third time. Exchangeable Mn was determined after each wetting and oven-drying. In the fourth cycle, the same procedure was adopted as in the third cycle except that the wetting of soils were done to twice their moisture equivalents. In the fifth and sixth cycles, the soils were wetted to their moisture equivalent and twice the moisture equivalent respectively, allowed to air-dry, rewetted, again air dried and repeated this process a third time. Exchangeable Mn was determined after each wetting, half air-drying, and complete air-drying. In all the above cycles a set of soils treated with $MnSO_4$ at the rate of twice their contents of available Mn was also included to study the effect of moisture content on the changes in applied Mn. Exchangeable Mn from the soil was extracted with neutral N ammonium acetate (Jackson, 1958) and Mn was determined by the potassium periodate method (Piper, 1950).

It is clear from cycle numbers land 2 in Figure 1 that maintenance of the two soils at two different moisture levels results in a drastic reduction of exchangeable Mn after 60 days. This reversion is more severe in medium black soil than in lateritic soil. The same trend is observed in the case of applied Mn also. In the presence of water, manganous oxides and manganese dioxide form an insoluble hydrated complex. These results are in concurrence with the observations of Fujimoto and Sherman (1945) and Wain et al. (1945) Alternate wetting and drying (Cycle Nos. 3, 4, 5 and 6 in Figure 1} result in increased release of exchangeable Mn with progress of time in both the soils. This is true in respect of both control and treated soils. This is due to the reduction of higher oxides of Mn which differ in their redox potential. The rate of increase in Mn is more in lateritic soil than in

medium black soil. The increase in exchangeable Mn due to drying of the soil has been reported by McCool (1934), Fujimoto and Sherman (1945), Boken (1952), Zende (1954) and Hamers (1960). The increased release of Mn^{++} in iateritic soil is ascribed to the acidic nature of the soil whereas alkaline reaction and high base status might have contributed to greater immobilization in medium black soil.

സംഗ്രഹം

വെട്ടുകൽ മണ്ണിലും കറുത്ത കാൽകേറിയസ് fflspf} ിലും ജലാംശത്തിന്റെ തോത് അൽപ മൂലകമായ മാംഗനീസിന്റെ ലഭ്യതയെ എങ്ങനെ ബാധിക്കുമെന്ന് പഠിക്കുവാൻ പ്രസ്തുത മൂലകം മണ്ണിൽ ചേർത്തും ചേർക്കാതെയും ലബോറട്ടറി പരീക്ഷണങ്ങൾ നടത്തി. ഇതിൽ നിന്നും, നനവുള്ള അവസ്ഥയിൽ മണ്ണു തുടർച്ചയായി 60 ദിവസത്തേയ്ക്ക് സൂക്ഷിച്ചപ്പോൾ, ലഭ്യമായ മാംഗനീസിന്റെ അളവു വളരെ കുറഞ്ഞു വരുന്നതായി കാണപ്പെട്ടു. എന്നാൽ മേൽപറഞ്ഞ മണ്ണുകൾ ഒന്നിടവിട്ട് ഉണങ്ങുവാനും നനയുവാനും അനുവദിച്ചപ്പോൾ ലഭ്യമായ മാംഗനീസിന്റെ തോത് കൂടിവരുന്നതായി പരീക്ഷണങ്ങളിൽ നിന്നും തെളിഞ്ഞു. വെട്ടുകൽ മണ്ണിനെ അപേക്ഷിച്ച് കറുത്ത മണ്ണിൽ മാംഗനീസിന്റെ ലഭ്യത വളരെ കുറവായിരുന്നു.

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