

温度和水分对不同肥料条件下黑土磷形态转化的影响及机制

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Effects and their mechanisms of temperature and moisture on phosphorous transformation in black soil manured with different fertilizers

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摘要 采用室内微宇宙试验法, 研究了温度(25℃和10℃)、土壤湿度(湿度分别为最大持水量的50%和25%, 即50% WHC和25%WHC)对不同肥料条件下黑土磷素形态转化及土壤磷酸酶活性的影响。结果表明, 土壤温度和水分及其交互作用对不同肥料条件下土壤磷形态转化以及土壤酶活性有显著影响。土壤温度(25℃)和土壤湿度(50% WHC)显著增加了土壤有效磷、Ca₂-P、Ca₈-P的含量, 而土壤有机磷含量显著降低; 在土壤中添加氮磷钾肥料后, 这种作用变得尤为明显。高的土壤温度(25℃)和合适的土壤湿度(25%WHC)能够显著提高土壤磷酸酶的活性。土壤磷酸酶活性与土壤有效磷含量均呈显著正相关, 表明可以通过提高土壤温度和保持土壤合适的湿度来提高土壤磷酸酶, 活化和提高土壤磷的有效性, 进而促进土壤磷释放。

关键词: 温度 水分 黑土 磷形态转化 土壤酶活性 温度 水分 黑土 磷形态转化 土壤酶活性**Abstract:**

Microcosm experiments were conducted to study the effects of temperature such as 25℃ & 10℃ and soil moisture such as 50%, and 25% of the largest water holding capacity of soil (WHC) on transformation of phosphorus, and the activities of acid phosphatase in the black soil receiving nitrogen & potassium fertilizers (NK), and nitrogen, phosphate, and potassium fertilizers (NPK). The statistic significant effects of temperature and moisture on phosphate transformation, and acid phosphatase activities were found in the present paper. High temperature such as 25℃ and moisture such as (50% WHC) can significantly increase contents of available phosphorus, Ca₂-P, and Ca₈-P, however, significantly decrease the content of organic phosphorus in soils especially in the soils manured with NPK. High temperature such as 25℃ and appropriate moisture such as 25% WHC can enhance acid phosphatase activities. The significantly positive correlation between the activity of acid phosphatase and the content of available phosphorus was also found in the present paper. It indicates that we can increase acid phosphatase activity to activate and enhance the availability of phosphorus in soil and to promote phosphorus to be released from black soil through adjusting soil temperature and moisture.

Keywords:

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