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भाकृअनुप-भारतीय मृदा विज्ञान संस्थान

नबीबाग बैरसिया रोड, भोपाल- 462038 (म.प्र.)

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Application No. 291-1/IISS/RTI/2024

Dated 02/04/2024

To,

Shri Adarsh Dilip Tirpude  
Life Line Pharmacy, Shastri Nagar  
Kothrud, Pune (Maharashtra) - 411038

Sub.: Reply to information under RTI Act, 2005- reg.

Dear Sir,

Please find enclosed herewith the information (three pages) in response to your RTI application (registration no. IIOSS/R/T/24/00004 dated 02/04/2024) transferred online by ICAR Hqrs. (reference no. ICARH/R/X/24/00004 dated 02/04/2024). Kindly acknowledge the receipt of this reply letter along with enclosures. Further it is informed that the Appellate Authority is Director, ICAR-IISS, Bhopal and his telephone no. is 0755-2730946.

Yours sincerely,

Encl: Information containing three pages

(R. Elanchezhian)

PS & Nodal Officer RTI cum-CPIO (Scientific)

## ICAR – Indian Institute of Soil Science, Bhopal

For S. No. 01 to 04 : No information available at this institute.

S. No. 05 : Could you provide information on any finding regarding the use of fertilizers and their long-term effects on environmental and health of the peoples?

Under AICRPs of ICAR IISS Bhopal including AICRP on LTFE, STCR and MSPE, research has been carried out on the effect of balanced fertilizer application including secondary and micronutrients on crop yield and crop quality. It has been found that imbalanced application of fertilizer nutrients resulted in reduced crop yield and low soil fertility levels.

The long-term experiments since 1973 have indicated no adverse effect of fertilizers on soil health. The soils of Himachal Pradesh are medium to high in available N, mostly low to medium in available P and K. In these soils also no decline in fertility has been reported with the use of balanced fertilization.

A case may be cited with respect to Punjab with high fertilizer consumption (one of the largest consumers of fertilizers in India). Fertilizer input has considerable contribution in enhancing crop yields in the region. Along with other inputs, the fertilizers have helped Punjab contributing 30-40% of rice and 40-50% of wheat in the central pool, thus, ensuring food security of the country. At the country level, Punjab produces 22% wheat, 11% rice, and 10% cotton from 1.5% geographical area. Assured irrigation conditions also engender higher fertilizer use. However, there exist cases where more susceptibility to certain plant diseases, pests and lodging and hence the yield loss is ascribed to the use of more than recommended dose of nitrogenous fertilizers. Excessive use of fertilizers on soils where soil test does not recommend otherwise has been observed to cause significant monetary loss.

It has been found that the status of available S and micronutrients in cultivated soils changed over the period. Inadequate and imbalanced application of these nutrients resulted in decline in availability of these nutrients in some soils. The research results have been published in biennial reports of AICRP-MSPE.

The AICRP on LTFE has been carrying research on the effect of continuous application of fertilizers and manures on crop productivity and soil quality. The AICRP on Long Term Fertilizer Experiments aimed to study the impact of different nutrient options i.e. Imbalance, balance and integrated nutrient management (100% NPK+FYM) on crop productivity and soil health in major crops and soil types. The field experiments comprised of control (without fertilizer), 100% N, 100% NP, 50% NPK, 100% NPK, 150% NPK, 100% NPK+lime, 100% NPK+FYM. Results of LTFE at different locations on impact of long-term use of imbalance, balance and integrated nutrient management options have been studied on crop productivity, soil organic carbon (SOC), soil microbial biomass (SMBC) etc. However, this AICRP (LTFE) did not work in the area of impact of LTFE treatments on health of peoples.

**Impact on crop productivity:** The treatments of long-term application of balanced and integrated nutrient management have significant effect on crop productivity. The 100% NPK + FYM gave the maximum crop yield at almost all the studied locations compared to the rest of the treatments. The yield across studied locations under super optimal dose of fertilizer i.e., 150% NPK is second highest after INM (100% NPK+FYM) except at Pantnagar. Yields under the different treatments followed the trend: 100% NPK + FYM/Lime > 150% NPK > 100% NPK > 100% N > Control (Table 1).

**Table 1. Effect of long-term application of fertilisers and manures on crop productivity (kg ha<sup>-1</sup>) under AICRP LTFE**

| Treatment      | Pantnagar |       | Jabalpur |       | Pattambi |      | Udaipur |       | Coimbatore    |       |
|----------------|-----------|-------|----------|-------|----------|------|---------|-------|---------------|-------|
|                | Rice      | Wheat | Soybean  | Wheat | Rice     | Rice | Maize   | Wheat | Finger millet | Maize |
| Control        | 1700      | 1250  | 825      | 1460  | 2299     | 1891 | 1415    | 1490  | 1321          | 2629  |
| 100% N         | 3220      | 3350  | 960      | 1850  | 2369     | 1983 | 2187    | 2825  | 1547          | 3913  |
| 100% NPK       | 4100      | 3805  | 1686     | 5265  | 3124     | 2937 | 3210    | 4435  | 2259          | 5453  |
| 150% NPK       | 3323      | 3270  | 2010     | 6038  | 3625     | 3494 | 3499    | 4695  | 2400          | 5476  |
| 100% NPK + FYM | 5412      | 4882  | 2080     | 6150  | 4082     | 3806 | 3794    | 4980  | 2643          | 6329  |
| 100% NPK+Lime  | -         | -     | -        | -     | 3373     | 3238 | -       | -     | -             | -     |

**Impact on Soil Organic Carbon:** Results on soil organic carbon (SOC) status at different locations of LTFEs (Table 2), clearly demonstrates the effect of INM i.e., 100% NPK+FYM indicating higher SOC than even super optimal dose (150% NPK), balance and imbalance nutrient options.

**Table 2. Effect of nutrient management on SOC (g kg<sup>-1</sup>) under long term fertilizer experimental sites of AICRP LTFE**

| Location   | Control | 100% N | 100% NPK | 150% NPK | 100% NPK+ Lime | 100% NPK+ FYM |
|------------|---------|--------|----------|----------|----------------|---------------|
| Pantnagar  | 6.15    | 9.0    | 9.80     | 8.84     | -              | 15.64         |
| Jabalpur   | 4.24    | 5.2    | 7.62     | 8.74     | -              | 8.95          |
| Pattambi   | 11.9    | 14.1   | 15.9     | 16.80    | 14.9           | 19.6          |
| Udaipur    | 5.10    | 6.5    | 7.60     | 8.10     | -              | 9.40          |
| Coimbatore | 4.59    | 5.1    | 6.17     | 6.35     | -              | 7.09          |

**Impact on Soil Microbial Biomass Carbon (SMBC):** The soil microbial biomass carbon (SMBC) is one of the key indicators of biological activities. The data of SMBC across the

studied LTFEs showed that INM (100% NPK+FYM) recorded highest SMBC followed by 150% NPK, 100% NPK, 100% N, control (Table 3). Overall, even the 150% NPK dose across LTFEs, the crop productivity and SMBC improved. In imbalance dose of nutrients, especially, 100% N, there is drastic reduction in yield and other soil properties, almost comparable to control and especially in Alfisols. This might be due to excessive development of acidity with N alone application that restricts nutrient supplying capacity of soil. Thus balance and integrated nutrient management (100% NPK+FYM) improved soil quality as well as sustained crop productivity.

**Table 3. Effect of long-term application of fertilizer and manure on soil microbial biomass carbon ( $\mu\text{g g}^{-1}$  soil)**

| Treatment      | Jabalpur | Pattambi | Udaipur | Coimbatore |
|----------------|----------|----------|---------|------------|
| Control        | 168.3    | 193.6    | 150     | 191        |
| 100% N         | 221.2    | 214.7    | 193     | 221        |
| 100% NPK       | 292.2    | 233.3    | 268     | 265        |
| 150% NPK       | 314.5    | 270.5    | 317     | 280        |
| 100% NPK + FYM | 343.5    | 318.9    | 365     | 289        |

Institute has not carried out any research on use of fertilizers and their long-term effects on health of the peoples.