**Integrated Nutrient Management in Potato-Baby corn Cropping Sequence and Its Impact on Soil Quality and Yield**

**Abstract**

A field experiment titled "Integrated Nutrient Management in Potato-Baby Corn Cropping Sequence and Its Impact on Soil Quality and Yield" was conducted during the rabi and summer seasons of 2016–17 and 2017–18 at the Instructional-cum-Research Farm of Assam Agricultural University, Jorhat. The experiment included sixteen treatments incorporating various nutrient combinations, such as 100% of the recommended dose (RD) of nitrogen (N) and different proportions of RD N supplemented with organic sources like farmyard manure (FYM), poultry manure, vermicompost, and enriched compost. Implemented in a randomized block design with three replications, the soil at the experimental site had a sandy loam texture, an acidic pH of 5.57, medium organic carbon content (0.75%), and moderate availability of N (292 kg/ha), P₂O₅ (25.80 kg/ha), and K₂O (272.18 kg/ha). The total rainfall recorded during the cropping sequence was 2336.40 mm in 2016–17 and 2107.10 mm in 2017–18, with temperatures ranging from 8.0°C to 35.1°C during both years. The results revealed that the treatment T₆ (50% RD N + 25% N through FYM + 25% N through vermicompost) achieved the highest growth and yield attributes for both potato and baby corn. In the case of potato, this treatment recorded the highest tuber yield over two years (27.77 t/ha). Similarly, for baby corn, T₆ resulted in the highest cob yield with husk (23.09 t/ha in 2016–17 and 24.83 t/ha in 2017–18).Furthermore, integrated nutrient management (INM) significantly improved soil physico-chemical parameters, increasing organic carbon content (0.98% and 1.02%), available N (391.33 and 423.33 kg/ha), available P (28.88 and 29.50 kg/ha), and available K (336.55 and 347.90 kg/ha) after the cropping sequence. Additionally, T₆ enhanced soil biological properties, including soil microbial biomass carbon, demonstrating its effectiveness in sustaining soil fertility and productivity.

Economically, T6 emerged as the most profitable practice, generating a net return of Rs 6,38,200.00 per hectare and a benefit-cost ratio (B:C) of 4.82 in the potato-baby corn cropping sequence. These findings establish the superiority of the 50% RD N + 25% N through FYM + 25% N through vermicompost (T6) treatment in enhancing crop growth, soil health, economic yield, and overall system productivity in this cropping sequence.

Keywords: *Integrated Nutrient Management, Potato, Babycorn, Enriched compost, Vermicompost*

1. **Introduction**

The potato, often hailed as the "King of Vegetables," is the third most important food crop globally, following rice and wheat. Its popularity in China and India, which together contribute 38% of global production, has driven its expansion. In India, potato production increased from 34.7 million metric tons (MT) in 2008 to 50.19 million MT in 2019, a 45% rise over a decade, with a projected annual growth rate of 3% until 2050. Potatoes are rich in starch, vitamins B and C, and essential amino acids, making them nutritionally significant. However, Assam lags behind the national average in productivity (7.5 t/ha) due to a lack of quality tubers, pest issues, and rainfed cultivation.

Similarly, maize, known as the "Queen of Cereals," is the third most cultivated cereal and plays a crucial role in food, feed, and industry. The introduction of baby corn, harvested young for vegetable use, offers high economic potential due to its short growth cycle (60–70 days) and high fodder yield. India’s low labour costs provide an advantage in manual harvesting, a practice common in top baby corn-exporting nations like Thailand, China, and Sri Lanka. Its increasing demand in Asia, Africa, and South America highlights its economic importance and potential for higher returns. (Dass *et al.,* 2004).

**2. Methods and Materials**

2.1 Experimental Design and Layout

The experiment was conducted at the AICRP (Potato) field, ICR Farm using a Randomized Block Design (RBD) with three replications and sixteen treatments, resulting in 48 plots. The total experimental area was 432 m² (24m × 18m), with individual plots measuring 3m × 3m. The tested varieties were Kufri Pukhraj (potato) and G 5414 (baby corn).

2.2 Treatment Details

The experiment included combinations of organic and inorganic fertilizers:

* T1: 100% RD of N
* T2-T5: 75% RD of N + 25% N from FYM, poultry manure, vermicompost, or enriched compost
* T6-T8: 50% RD of N + 25% N from one organic source + 25% from another
* T9-T12: 50% RD of N + 50% N from a single organic source
* T13-T16: 50% RD of N + 25% N from a single organic source

2.3 Crop Management

Potato (Kufri Pukhraj):

* Tuber traits: Early bulking, ovoid yellow tubers with medium deep eyes
* Resistance: Early blight (resistant), late blight (moderately resistant)
* Duration: 70–90 days
* Yield: 250–400 q/ha

Baby Corn (G 5414):

* Harvest: First harvest at 49–55 days, 2–3 cobs per plant

2.4 Fertilizer and Biofertilizer Application

* Organic Manures (FYM, poultry manure, vermicompost, enriched compost): Applied at planting/sowing.
* Biofertilizers: Tubers coated before planting.

2.5 Planting and Spacing

* Potato: 22.5 q/ha, 50 cm × 20 cm spacing, manually planted (26th & 29th Nov), irrigated thrice.
* Baby Corn: 25 kg/ha, 60 cm × 20 cm spacing, sown on 12th April & 28th March.

2.6 Data Collection and Analysis

* Tuber Yield and Grading: Sorted into <25g, 25–50g, 50–75g, and >75g categories, converted to t/ha.
* Nutrient Uptake: Calculated as nutrient concentration × yield.
* Microbial Biomass Carbon (MBC): Assessed via chloroform fumigation-extraction, using MBC (μg g⁻¹) = Ec/KEC.
  1. **Results and Discussion**

The results indicated that different INM treatments significantly influenced grade-wise tuber yield (Table 1). The highest tuber yield across all grades was recorded in T6 (50% RD of N + 25% N through FYM + 25% N through vermicompost), followed by T8. The increased yield can be attributed to improved soil mineralization, enhanced nutrient availability, and the synergistic effect of biofertilizers with organic sources, supporting findings by Singh *et al.* (2005).Total tuber yield (Table 2) followed a similar trend, with T6 recording the highest yield of 30.31 t/ha and 25.23 t/ha during both years, followed by T8 (23.04 t/ha. Nutrient uptake by both the haulm and tuber was significantly affected by INM (Tables 3–8). T6 consistently recorded the highest N, P, and K uptake, followed by T8. The increased uptake in T6 is likely due to improved vegetative growth, root development, and better nutrient assimilation. Similarly, in the case of baby corn, the highest cob yield was recorded in T6 (23.09 t/ha with husk, 9.39 t/ha without husk), followed by T8, reflecting the beneficial impact of integrated nutrient management on crop productivity (Tables 9 & 10).

Soil health parameters were also positively influenced by INM treatments. T6 exhibited the highest organic carbon content (0.98–1.02%) and microbial biomass carbon, indicating improved soil fertility and microbial activity. Furthermore, T6 provided the highest net return of Rs. 6,38,200/ha and a benefit-cost ratio (B:C) of 4.82, making it the most economically viable treatment.

Overall, T6 (50% RD of N + 25% N through FYM + 25% N through vermicompost) emerged as the best INM practice, leading to higher crop productivity, enhanced nutrient uptake, improved soil fertility, and better economic returns. These findings highlight the potential of integrated nutrient management as a sustainable approach for maintaining soil health and boosting agricultural productivity.

**Table1. Influence of different INM practices on grade wise tuber yield of potato**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatments** | **Grade wise tuber yield (t/ha)** | | | | | | | |
| **<25g** | | **25-50g** | | **50-75g** | | **>75g** | |
| **2016-17** | **2017-18** | **2016-17** | **2017-18** | **2016-17** | **2017-18** | **2016-17** | **2017-18** |
| T1 : 100% RD of N | 3.96 | 3.25 | 5.28 | 4.62 | 6.15 | 5.18 | 5.53 | 3.57 |
| T2: 75% RD of N + 25% N through FYM | 4.14 | 3.23 | 5.72 | 4.27 | 6.35 | 6.87 | 6.05 | 3.95 |
| T3: 75% RD of N + 25% N through poultry manure | 4.11 | 3.24 | 5.12 | 4.45 | 6.27 | 6.87 | 5.52 | 4.06 |
| T4: 75% RD of N +25% N through vermicompost | 3.60 | 2.18 | 4.43 | 4.05 | 6.95 | 6.59 | 5.76 | 4.06 |
| T5: 75% RD of N + 25% N through enriched compost | 3.21 | 2.27 | 5.24 | 5.24 | 7.43 | 5.60 | 6.24 | 3.72 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 5.51 | 4.54 | 6.94 | 6.98 | 9.82 | 8.60 | 8.04 | 5.14 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 3.35 | 3.08 | 5.04 | 5.19 | 7.65 | 6.81 | 6.31 | 3.90 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 4.57 | 3.33 | 5.99 | 5.78 | 7.68 | 7.08 | 7.39 | 4.25 |
| T9: 50% RD of N + 50% N through FYM | 2.63 | 3.05 | 5.72 | 5.49 | 5.48 | 5.70 | 5.06 | 4.18 |
| T10: 50% RD of N + 50% N through poultry manure | 4.53 | 3.23 | 4.17 | 5.19 | 6.47 | 6.40 | 6.41 | 4.05 |
| T11: 50% RD of N + 25% N through poultry manure | 3.77 | 3.02 | 5.09 | 4.88 | 4.87 | 5.60 | 6.34 | 3.65 |
| T12: 50% RD of N + 50% N through vermicompost | 3.93 | 2.18 | 4.96 | 5.96 | 5.96 | 6.15 | 5.72 | 3.80 |
| T13: 50% RD of N + 25% N through FYM | 3.21 | 1.96 | 5.15 | 4.95 | 5.28 | 5.60 | 5.44 | 4.16 |
| T14: 50% RD of N + 25% N through poultry manure | 2.81 | 3.37 | 4.95 | 4.17 | 5.19 | 5.43 | 5.61 | 3.82 |
| T15: 50% RD of N + 25% N through vermicompost | 4.01 | 1.93 | 4.29 | 4.29 | 4.29 | 5.65 | 5.18 | 3.77 |
| T16: 50% RD of N + 25% N through enriched compost | 4.37 | 2.96 | 5.50 | 5.48 | 7.35 | 6.29 | 4.76 | 3.49 |
| S.Em(±) | 0.29 | 0.37 | 0.57 | 0.56 | 0.70 | 0.49 | 0.59 | 0.27 |
| CD(p=0.05) | 0.85 | 1.07 | NS | NS | 2.02 | 1.41 | 1.72 | NS |

INM-Integrated nutrient management, NS – Non-significant

**Table 2. Influence of different INM practices on tuber yield of potato**

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatments** | **Total tuber yield (t/ha)** | | |
| **2016-17** | **2017-18** | **Pooled** |
| T1 : 100% RD of N | 20.92 | 16.62 | 18.77 |
| T2: 75% RD of N + 25% N through FYM | 22.26 | 18.32 | 20.29 |
| T3: 75% RD of N + 25% N through poultry manure | 21.02 | 18.62 | 19.83 |
| T4: 75% RD of N +25% N through vermicompost | 20.74 | 16.88 | 18.80 |
| T5: 75% RD of N + 25% N through enriched compost | 22.12 | 16.83 | 19.47 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 30.31 | 25.23 | 27.77 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 22.35 | 18.98 | 20.66 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 25.64 | 20.44 | 23.04 |
| T9: 50% RD of N + 50% N through FYM | 18.89 | 18.42 | 18.64 |
| T10: 50% RD of N + 50% N through poultry manure | 21.58 | 18.87 | 20.22 |
| T11: 50% RD of N + 25% N through poultry manure | 20.08 | 17.15 | 18.61 |
| T12: 50% RD of N + 50% N through vermicompost | 20.57 | 18.09 | 19.33 |
| T13: 50% RD of N + 25% N through FYM | 19.08 | 16.67 | 17.87 |
| T14: 50% RD of N + 25% N through poultry manure | 18.56 | 16.79 | 17.67 |
| T15: 50% RD of N + 25% N through vermicompost | 17.78 | 15.64 | 16.71 |
| T16: 50% RD of N + 25% N through enriched compost | 21.98 | 18.22 | 20.10 |
| S.Em(±) | 0.53 | 0.86 | 0.83 |
| CD(P=0.05) | 1.53 | 2.48 | 1.68 |

INM- Integrated nutrient management

**Table3. Influence of different INM practices on nitrogen uptake by haulm of potato**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **N (kg/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 18.86 | 16.40 |
| T2: 75% RD of N + 25% N through FYM | 16.09 | 15.79 |
| T3: 75% RD of N + 25% N through poultry manure | 15.48 | 15.51 |
| T4: 75% RD of N +25% N through vermicompost | 15.90 | 15.67 |
| T5: 75% RD of N + 25% N through enriched compost | 16.52 | 16.67 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 23.88 | 24.05 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 16.84 | 17.50 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 20.60 | 20.82 |
| T9: 50% RD of N + 50% N through FYM | 14.90 | 15.01 |
| T10: 50% RD of N + 50% N through poultry manure | 17.46 | 16.37 |
| T11: 50% RD of N + 25% N through poultry manure | 16.89 | 17.47 |
| T12: 50% RD of N + 50% N through vermicompost | 17.67 | 17.73 |
| T13: 50% RD of N + 25% N through FYM | 16.53 | 16.76 |
| T14: 50% RD of N + 25% N through poultry manure | 15.93 | 16.68 |
| T15: 50% RD of N + 25% N through vermicompost | 16.48 | 16.58 |
| T16: 50% RD of N + 25% N through enriched compost | 16.77 | 17.12 |
| S.Em(±) | 0.92 | 0.66 |
| CD(P=0.05) | 2.67 | 1.91 |

INM-Integrated nutrient management

**Table 4. Influence of different INM practices on phosphorous uptake by haulm of potato**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **P (kg/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 4.82 | 4.23 |
| T2: 75% RD of N + 25% N through FYM | 4.29 | 3.99 |
| T3: 75% RD of N + 25% N through poultry manure | 4.19 | 4.10 |
| T4: 75% RD of N +25% N through vermicompost | 4.28 | 4.03 |
| T5: 75% RD of N + 25% N through enriched compost | 4.45 | 3.97 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 6.55 | 6.59 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 4.32 | 4.15 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 4.87 | 4.52 |
| T9: 50% RD of N + 50% N through FYM | 4.65 | 3.83 |
| T10: 50% RD of N + 50% N through poultry manure | 4.25 | 4.08 |
| T11: 50% RD of N + 25% N through poultry manure | 4.59 | 4.49 |
| T12: 50% RD of N + 50% N through vermicompost | 4.47 | 4.44 |
| T13: 50% RD of N + 25% N through FYM | 4.57 | 4.38 |
| T14: 50% RD of N + 25% N through poultry manure | 4.30 | 4.27 |
| T15: 50% RD of N + 25% N through vermicompost | 4.28 | 4.20 |
| T16: 50% RD of N + 25% N through enriched compost | 4.40 | 4.34 |
| S.Em(±) | 0.29 | 0.20 |
| CD(P=0.05) | 0.85 | 0.59 |

INM-Integrated nutrient management

**Table5. Influence of different INM practices on potassium uptake by haulm of potato**

|  |  |  |
| --- | --- | --- |
| **Treatment** | **K (kg/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 9.93 | 9.21 |
| T2: 75% RD of N + 25% N through FYM | 9.33 | 9.02 |
| T3: 75% RD of N + 25% N through poultry manure | 9.00 | 8.96 |
| T4: 75% RD of N +25% N through vermicompost | 9.58 | 9.32 |
| T5: 75% RD of N + 25% N through enriched compost | 9.88 | 9.94 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 13.98 | 14.05 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 9.54 | 9.45 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 11.35 | 10.73 |
| T9: 50% RD of N + 50% N through FYM | 8.21 | 8.19 |
| T10: 50% RD of N + 50% N through poultry manure | 9.45 | 8.92 |
| T11: 50% RD of N + 25% N through poultry manure | 9.75 | 9.63 |
| T12: 50% RD of N + 50% N through vermicompost | 10.00 | 9.97 |
| T13: 50% RD of N + 25% N through FYM | 9.65 | 9.64 |
| T14: 50% RD of N + 25% N through poultry manure | 9.04 | 9.00 |
| T15: 50% RD of N + 25% N through vermicompost | 9.15 | 8.69 |
| T16: 50% RD of N + 25% N through enriched compost | 9.12 | 9.03 |
| S.Em(±) | 0.56 | 0.28 |
| CD(P=0.05) | 1.61 | 0.82 |

INM-Integrated nutrient management

**Table 6. Influence of different INM practices on nitrogen uptake by tuber of potato**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **N (kg/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 55.02 | 52.77 |
| T2: 75% RD of N + 25% N through FYM | 44.61 | 41.53 |
| T3: 75% RD of N + 25% N through poultry manure | 42.43 | 40.10 |
| T4: 75% RD of N +25% N through vermicompost | 52.66 | 50.52 |
| T5: 75% RD of N + 25% N through enriched compost | 42.03 | 41.54 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 76.88 | 72.33 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 44.64 | 43.33 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 60.84 | 58.71 |
| T9: 50% RD of N + 50% N through FYM | 50.43 | 46.55 |
| T10: 50% RD of N + 50% N through poultry manure | 53.61 | 41.57 |
| T11: 50% RD of N + 25% N through poultry manure | 47.41 | 43.51 |
| T12: 50% RD of N + 50% N through vermicompost | 46.57 | 44.38 |
| T13: 50% RD of N + 25% N through FYM | 48.66 | 41.51 |
| T14: 50% RD of N + 25% N through poultry manure | 43.53 | 42.83 |
| T15: 50% RD of N + 25% N through vermicompost | 47.46 | 41.47 |
| T16: 50% RD of N + 25% N through enriched compost | 51.10 | 43.23 |
| S.Em(±) | 3.71 | 3.54 |
| CD(P=0.05) | 10.72 | 10.21 |

INM-Integrated nutrient management

**Table 7. Influence of different INM practices on phosphorous uptake by tuber of potato**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **P (kg/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 14.06 | 13.34 |
| T2: 75% RD of N + 25% N through FYM | 11.29 | 10.59 |
| T3: 75% RD of N + 25% N through poultry manure | 11.27 | 10.59 |
| T4: 75% RD of N +25% N through vermicompost | 13.22 | 12.93 |
| T5: 75% RD of N + 25% N through enriched compost | 10.78 | 10.60 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 20.36 | 19.94 |
| T7: 50% RD of N + 25% N through Poultry manure + 25% N through enriched compost | 11.27 | 11.09 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 15.64 | 15.60 |
| T9: 50% RD of N + 50% N through FYM | 12.41 | 12.05 |
| T10: 50% RD of N + 50% N through poultry manure | 10.99 | 10.18 |
| T11: 50% RD of N + 25% N through poultry manure | 10.74 | 10.62 |
| T12: 50% RD of N + 50% N through vermicompost | 11.51 | 11.49 |
| T13: 50% RD of N + 25% N through FYM | 10.86 | 10.48 |
| T14: 50% RD of N + 25% N through poultry manure | 10.08 | 10.00 |
| T15: 50% RD of N + 25% N through vermicompost | 11.64 | 11.21 |
| T16: 50% RD of N + 25% N through enriched compost | 12.09 | 11.61 |
| S.Em(±) | 1.15 | 0.93 |
| CD(P=0.05) | 3.33 | 2.70 |

INM-Integrated nutrient management

**Table 8. Influence of different INM practices on potassium uptake by tuber of potato**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **K (kg/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 42.25 | 39.92 |
| T2: 75% RD of N + 25% N through FYM | 36.52 | 34.13 |
| T3: 75% RD of N + 25% N through poultry manure | 35.59 | 33.47 |
| T4: 75% RD of N +25% N through vermicompost | 42.23 | 41.24 |
| T5: 75% RD of N + 25% N through enriched compost | 33.83 | 33.06 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 60.32 | 56.72 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 40.40 | 37.05 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 48.43 | 47.79 |
| T9: 50% RD of N + 50% N through FYM | 40.14 | 38.09 |
| T10: 50% RD of N + 50% N through poultry manure | 39.09 | 34.07 |
| T11: 50% RD of N + 25% N through poultry manure | 38.62 | 35.68 |
| T12: 50% RD of N + 50% N through vermicompost | 38.65 | 35.75 |
| T13: 50% RD of N + 25% N through FYM | 37.37 | 34.03 |
| T14: 50% RD of N + 25% N through poultry manure | 37.30 | 32.68 |
| T15: 50% RD of N + 25% N through vermicompost | 38.03 | 34.84 |
| T16: 50% RD of N + 25% N through enriched compost | 40.60 | 36.05 |
| S.Em(±) | 2.55 | 2.85 |
| CD(P=0.05) | 7.35 | 8.22 |

INM-Integrated nutrient management

**Table 9. Influence of different INM practices on cob yield with husk**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **Cob yield with husk (t/ha)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 12.67 | 8.20 |
| T2: 75% RD of N + 25% N through FYM | 14.48 | 9.83 |
| T3: 75% RD of N + 25% N through poultry manure | 13.19 | 17.24 |
| T4: 75% RD of N +25% N through vermicompost | 11.64 | 12.72 |
| T5: 75% RD of N + 25% N through enriched compost | 11.70 | 14.19 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 23.09 | 24.83 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 11.46 | 19.35 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 18.81 | 21.07 |
| T9: 50% RD of N + 50% N through FYM | 13.84 | 17.45 |
| T10: 50% RD of N + 50% N through poultry manure | 13.71 | 12.71 |
| T11: 50% RD of N + 25% N through poultry manure | 10.95 | 10.85 |
| T12: 50% RD of N + 50% N through vermicompost | 16.44 | 16.02 |
| T13: 50% RD of N + 25% N through FYM | 13.50 | 14.72 |
| T14: 50% RD of N + 25% N through poultry manure | 14.28 | 16.60 |
| T15: 50% RD of N + 25% N through vermicompost | 11.70 | 8.35 |
| T16: 50% RD of N + 25% N through enriched compost | 15.30 | 19.23 |
| S.Em(±) | 1.17 | 0.93 |
| CD(P=0.05) | 3.38 | 2.68 |

INM-Integrated nutrient management

**Table10. Influence of different INM practices on cob yield without husk**

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatments** | **Cob yield without husk (t/ha)** | | |
| **2016-17** | **2017-18** | **Pooled** |
| T1 : 100% RD of N | 5.81 | 4.95 | 5.38 |
| T2: 75% RD of N + 25% N through FYM | 7.07 | 4.83 | 5.95 |
| T3: 75% RD of N + 25% N through poultry manure | 4.99 | 5.90 | 5.45 |
| T4: 75% RD of N +25% N through vermicompost | 6.02 | 5.27 | 5.64 |
| T5: 75% RD of N + 25% N through enriched compost | 5.42 | 5.25 | 5.33 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 8.38 | 9.40 | 9.39 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 5.90 | 5.19 | 5.55 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 7.45 | 7.65 | 7.55 |
| T9: 50% RD of N + 50% N through FYM | 4.58 | 5.23 | 4.91 |
| T10: 50% RD of N + 50% N through poultry manure | 5.12 | 5.22 | 5.17 |
| T11: 50% RD of N + 25% N through poultry manure | 5.37 | 5.01 | 5.19 |
| T12: 50% RD of N + 50% N through vermicompost | 4.38 | 5.50 | 4.94 |
| T13: 50% RD of N + 25% N through FYM | 4.98 | 4.82 | 4.90 |
| T14: 50% RD of N + 25% N through poultry manure | 4.13 | 5.04 | 4.58 |
| T15: 50% RD of N + 25% N through vermicompost | 5.26 | 5.90 | 5.58 |
| T16: 50% RD of N + 25% N through enriched compost | 5.28 | 5.13 | 5.20 |
| S.Em(±) | 0.64 | 0.58 | 0.61 |
| CD(P=0.05) | 1.85 | 1.69 | 1.23 |

INM- Integrated nutrient management

**Table 11. Influence of different INM practices on soil microbial biomass carbon**

|  |  |  |
| --- | --- | --- |
| **Treatments** | **MBC (µg g-1 soil)** | |
| **2016-17** | **2017-18** |
| T1 : 100% RD of N | 243.88 | 249.11 |
| T2: 75% RD of N + 25% N through FYM | 300.53 | 305.90 |
| T3: 75% RD of N + 25% N through poultry manure | 292.29 | 296.96 |
| T4: 75% RD of N +25% N through vermicompost | 328.71 | 333.35 |
| T5: 75% RD of N + 25% N through enriched compost | 298.78 | 304.02 |
| T6: 50% RD of N + 25% N through FYM +25% N through vermicompost | 364.44 | 372.18 |
| T7: 50% RD of N + 25% N through poultry manure + 25% N through enriched compost | 344.93 | 348.93 |
| T8: 50% RD of N + 25% N through FYM + 25% N through poultry manure | 336.27 | 350.55 |
| T9: 50% RD of N + 50% N through FYM | 281.29 | 288.14 |
| T10: 50% RD of N + 50% N through poultry manure | 313.82 | 317.31 |
| T11: 50% RD of N + 25% N through poultry manure | 301.32 | 304.39 |
| T12: 50% RD of N + 50% N through vermicompost | 306.38 | 309.98 |
| T13: 50% RD of N + 25% N through FYM | 301.28 | 306.62 |
| T14: 50% RD of N + 25% N through poultry manure | 293.96 | 300.44 |
| T15: 50% RD of N + 25% N through vermicompost | 306.04 | 314.15 |
| T16: 50% RD of N + 25% N through enriched compost | 279.50 | 287.35 |
| S.Em(±) | 9.21 | 7.87 |
| CD(P=0.05) | 26.60 | 20.74 |

INM-Integrated nutrient management

* 1. **Conclusion**

Based on results of two years experimentation, the integrated use of inorganic and organic sources of nutrients proved superior to inorganic alone in respect of growth parameters and yield of potato and babycorn in sequence.

Among the different integrated nutrient management practices, application of 50% RD of N + 25% N through FYM + 25% N through vermicompost (T6) was found to be the best integrated nutrient management practice for overall growth and yield of potato and babycorn crop grown in sequence. It also resulted in better soil health parameters, net returns, benefit cost ratio as a whole.

* 1. **References**

1. AICRP (Potato) Annual Report (2018-19). All India Coordinated Research Project on Potato, ICAR, Shimla, India.
2. Dass, A.; Lenka, N.K.; Sudhishri, S. and Patnaik, U.S. (2004). Influence of integrated nutrient management on production, economics and soil properties in baby corn under on-farm condition in eastern ghats of Orissa. Indian J. Agril. Sci. 78: 40-43.
3. De, R. (1960). The role of nitrogen, phosphorus, and potassium in potato growth and tuber development. *Journal of Agricultural Science*, 55(3), 245-258.
4. FAO (2020). The State of Food and Agriculture. Food and Agriculture Organization of the United Nations, Rome.
5. Government of India (2019). Horticultural Statistics at a Glance. Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare, New Delhi.
6. Grewal, J.S., Kang, G.S., & Sharma, R.C. (1991). Effect of integrated nutrient management on potato production in alluvial soils. *Indian Journal of Agronomy*, 36(2), 220-225.
7. Islam, M.M., Karim, A.J.M.S., Jahiruddin, M., Majid, N.M., Miah, M.G., & Hakim, M.A. (2013). Effects of organic manure and chemical fertilizers on soil properties and the growth of potato. *Scientia Horticulturae*, 164, 157-167.
8. Khalak, A., & Kumaraswamy, K. (1992). Influence of integrated nutrient management on phosphorus and potassium uptake in crops. *Indian Journal of Soil Science*, 40(1), 30-34.
9. Lal, S.S., & Arora, R.K. (1994). Nutrient management for sustainable potato production in India. *Indian Journal of Agricultural Sciences*, 64(10), 707-712.
10. Sharma, R.C., & Sharma, J.P. (1990). Effect of NPK fertilization on potato yield and tuber quality in north-western Himalayas. *Journal of Indian Potato Association*, 17(1), 15-19.
11. Singh, S.K., Singh, R.K., & Lal, S.S. (2005). Impact of integrated nutrient management on tuber yield and soil properties in potato-based cropping systems. *Indian Journal of Horticulture*, 62(4), 382-385.