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Journal Name:	Asian Journal of Agricultural Extension, Economics & Sociology
Manuscript Number:	Ms_AJAEES_33863
Title of the Manuscript:	Improving Nitrogen Use Efficiency of Urea by using Urease and Nitrification Inhibitors and Plant Growth Regulators under Spinach Crop
Type of the Article	Original Research Article

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	The manuscript is very good and it gives room for other researchers to work on but the major corrections are required in Abstract, Materials and Methods and Results parts of the manuscript. Following the review of Research Article titled "Improving Nitrogen Use Efficiency of Urea by using Urease and Nitrification Inhibitors and Plant Growth Regulators under Spinach Crop". Since the requested changes are major, I recommend that it should be revised taking into account the changes requested as follows; - Under the abstract, the full meaning of nBTPT, DCD and DMPP should be written first before the acronyms for easy understanding. Thanks - Under abstract, which method of soil sample did you used to collect your soil sample and at what depth? Please, give detail. - Under the Materials and Methods, how did you carry	Reply 1 N-(n-butyl) thiophosphoric triamide (nBTPT): Among the different UIs, nBTPT or "Agrotain" is one of the most widely used UI. This is due to the fact that it remains effective at a very low concentration (0.01%), stable during storage, ease in transportation and impregnation onto solid urea fertilizer as well as incorporation into liquid urea-solution. After application, nBTPT stays together and move along with urea molecule in the soil (Christianson and Howard 1994). Dicyandiamide (DCD): Dicyandiamide was discovered as a NI in the early 1920s and since then its effectiveness as a NI in reducing NO₃- leaching, N₂O emissions and improving N use efficiency (NUE) has been tested extensively under different cropping and climatic conditions (Amberger, 1989). 3, 4-Dimethylpyrazol-phosphate (DMPP): DMPP is relatively a new NI, developed by BASF (Germany) and has several advantages over DCD and nitrapyrin. Lower application rates (0.5 to 1.0 kg of the active compound ha⁻¹) are needed to achieve optimal nitrification inhibition to reduce N₂O emissions and NO₃- leaching (Weiske et al., 2001a; Zerulla et al., 2001a). Reply 2 Representative soil samples collected from different sites surrounding the experimental area at 0-30 and 30-60 cm depths, which were air dried, passed through 2mm sieve. Spinach was grown as test crops under glasshouse conditions. The experiment was laid out in Randomize Completely Design (CRD) with nine treatments and four replications. Composite soil samples were collected before the experiment in a composite sample for various physico-chemical analysis viz soil texture, soil pH, organic matter, bulk density, NH₄-N, NO₃-N, extractable P and exchangeable K. Statistical analysis was carried out using the procedure given by Steele <i>et al.</i>, 1997. The detail of the treatments is given below. The pot size was 1 x 1 m². The treatment of N fertilizer was applied in two splits, P and K fertilizers were applied at the recommended rates at the time of sowing as follows: N application rate: @ 150 kg/ha DCD application:@ 10 kg/ha DMPP application: @ 2 kg/ha



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	out your physio-chemical analysis or according to whom, please make reference. - With what instruments or equipment did you use to measure your growth and yields parameters? kindly give details - The values in Table 1 and 2 should be in two decimal places for uniformity. - Tables 1 and 2 should be in three lines' tables. For example; Table 1: <table border="1"> <thead> <tr> <th>Treatments</th> <th>Plant height (cm)</th> <th>Number of leaves</th> <th>Fresh weight (g)</th> </tr> </thead> <tbody> <tr> <td>T1</td> <td>5.58</td> <td>25.50</td> <td>8.52</td> </tr> <tr> <td>T2</td> <td>7.17</td> <td>62.75</td> <td>15.79</td> </tr> <tr> <td>T3</td> <td>8.33</td> <td>53.50</td> <td>14.12</td> </tr> <tr> <td>T4</td> <td>7.79</td> <td>54.50</td> <td>14.32</td> </tr> </tbody> </table>	Treatments	Plant height (cm)	Number of leaves	Fresh weight (g)	T1	5.58	25.50	8.52	T2	7.17	62.75	15.79	T3	8.33	53.50	14.12	T4	7.79	54.50	14.32	GA3 application rate: @ 60 gram/ha Treatments of Spinach trial <table border="1"> <tbody> <tr> <td>T1</td> <td>No Nitrogen or GA₃ (Control)</td> </tr> <tr> <td>T2</td> <td>Urea only @150 kg N/ha</td> </tr> <tr> <td>T3</td> <td>Agrotain treated Urea + DCD@10 kg/ha</td> </tr> <tr> <td>T4</td> <td>Urea@150 kg/ha + GA₃ @60 gram/ha</td> </tr> <tr> <td>T5</td> <td>Agrotain treated urea@150 kg/ha + DCD @10 kg/ha + GA₃@60 gram/ha</td> </tr> <tr> <td>T6</td> <td>Agrotain treated urea @150 kg/ha + DMPP@2 kg/ha</td> </tr> <tr> <td>T7</td> <td>Agrotain treated urea @150 kg/ha + DMPP@2 kg/ha + GA₃@60 gram/ha</td> </tr> <tr> <td>T8</td> <td>Nitrophoska @150 kg N/ha</td> </tr> <tr> <td>T9</td> <td>Nitrophoska @150 kg/ha + GA₃@60 gram/ha</td> </tr> </tbody> </table> Replications: 4 Seed Rate: 10 to 15 seed/pot Time of Sowing: 7th November, 2011 Germination Time: After 6 days of sowing Statistical design: Completely Randomized Design (CRD) Lay out: 9 x 4 = 36 pots Test Crops: Spinach were grown under glasshouse conditions. Reply 3; Reply 3 and 4: Materials and Method, Physio-Chemical Analysis, References, Instruments/ Equipment used: Soil was crushed, passed through a 2 mm sieve and analyzed for different physical and chemical characteristics according to standard procedures. The results are reported as; 1.Bulk Density (g cm⁻³). The bulk density (BD) of soils was determined at two stages viz before sowing and after harvest of the spinach crop. 2. pH. The pH of the saturated extract was determined using pH meter in accordance to the method described by McLean (1982). 10 g of soil was taken and 25 ml distilled water was added to make 1:10 soil solution then pH of soil sample was determined with the	T1	No Nitrogen or GA ₃ (Control)	T2	Urea only @150 kg N/ha	T3	Agrotain treated Urea + DCD@10 kg/ha	T4	Urea@150 kg/ha + GA ₃ @60 gram/ha	T5	Agrotain treated urea@150 kg/ha + DCD @10 kg/ha + GA ₃ @60 gram/ha	T6	Agrotain treated urea @150 kg/ha + DMPP@2 kg/ha	T7	Agrotain treated urea @150 kg/ha + DMPP@2 kg/ha + GA ₃ @60 gram/ha	T8	Nitrophoska @150 kg N/ha	T9	Nitrophoska @150 kg/ha + GA ₃ @60 gram/ha
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		help of pH meter. 3. ECe (dS m⁻¹): The electrical conductivity of soil extract was measured by Wheatstone bridge as described by Rhoades (1982). Five g soil sample was taken and 50 ml distilled water was added to make 1:10 soil solution then EC of soil sample was determined with the help of conductivity meter. 4.Lime/ CaCO₃ eq (%). method devised by Nelson (1982) was followed. 5.Organic Matter (%). The method of Nelson and Sommers (1982) was used for the determination of organic matter by oxidizing organic carbon with excess of chromic acid and the unused chromic acid was determined by titration with ferrous ammonium sulfate solution. 6.Total Nitrogen (%). The Kjeldahl's method modified by Keeney and Nelson (1982) was adopted for N determination in soil samples. 7.Available Phosphorus (μ g g⁻¹). Available phosphorus was determined by sodium bi-carbonate extract according to Olsen and Sommers (1982) using spectrophotometer. 8.Available Potassium (μ g g⁻¹). Ammonium acetate Extraction method was used for the determination of K in the soil samples as described by Knudsen <i>et al.</i> (1982). 9.Soil Texture. The particle size distribution was determined according to Koehler <i>et al.</i>, (1984) by determining percentage of sand, silt and clay with hydrometric method. 50g soil was taken in a dispersion cup, 1% sodium hexametaphosphate was added as dispersing agent and the suspension was shaken on electric shaker for 15 minutes. The suspension was transferred to a one liter graduated cylinder and the volume was made up to the mark. Hydrometer and thermometer were inserted after 40 sec and 2 hours for initial and final readings. 10.NH₄-N/ NO₃-N ratios. Spinach supplied with NO₃-N as its sole N source had the highest fresh and dry weight, which were almost 5 times higher respectively of the treatment applied with only NH₄⁺-N treatment. Previous studied also showed that the highest yield of plant
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		was produced at 0:100 of $\text{NH}_4\text{-N}/\text{NO}_3\text{-N}$ ratio (Wang <i>et al.</i>, 2005). 11.Extractable Phosphorus. Soils in the bottles were kept at field capacity level by the addition of distilled water with the help of Pasteur pipette to compensate of moisture loss. AB-DTPA extractable phosphorus was measured with the help of Spectronic 601 spectrophotometer at 0, 7, 14, 28, 56 and 84 days of incubation interval (Soltanpur and Schwab, 1977). 12. Exchangeable Potassium. Methods of determining exchangeable K^+ of soil by mixing extracting solutions and analyzing the soil suspension with ion-selective electrodes were developed and evaluated on 30 samples of soils.
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Minor REVISION comments																																																																												
Optional/General comments	Author(s) need to do the necessary corrections. The values in the tables should be in two decimal places and the table should be restricted to three lines.	Reply 5 and 6: Table 1. Plant Height (cm), Number of Leaves, Fresh Weight (g), Dry Weight (g) and Biological Yield (g pot⁻¹) of Spinach <table border="1"> <thead> <tr> <th>Treatments</th><th>Plant Height (cm)</th><th>Number of Leaves per Spinach</th><th>Fresh Weight (g)</th><th>Dry Weight (g)</th><th>Biological Yield (g pot⁻¹)</th></tr> </thead> <tbody> <tr><td>T₁</td><td>5.88 d</td><td>25.5 d</td><td>8.52 d</td><td>3.40 c</td><td>202 d</td></tr> <tr><td>T₂</td><td>7.17 cd</td><td>62.75 ab</td><td>15.79 bc</td><td>4.30 ab</td><td>216 bc</td></tr> <tr><td>T₃</td><td>8.33 cd</td><td>53.50 bc</td><td>14.12 c</td><td>4.28 ab</td><td>223 ab</td></tr> <tr><td>T₄</td><td>7.79 cd</td><td>54.50 abc</td><td>14.32 c</td><td>3.90 bc</td><td>213 c</td></tr> <tr><td>T₅</td><td>10.99 ab</td><td>54.00 abc</td><td>17.63 bc</td><td>4.43 ab</td><td>225 abc</td></tr> <tr><td>T₆</td><td>11.54 a</td><td>68.75 a</td><td>22.37 a</td><td>4.64 a</td><td>227 a</td></tr> <tr><td>T₇</td><td>8.67 bc</td><td>65.50 ab</td><td>19.41 ab</td><td>4.29 ab</td><td>215 bc</td></tr> <tr><td>T₈</td><td>9.66 abc</td><td>36.25 c</td><td>16.59 bc</td><td>4.17 ab</td><td>216 bc</td></tr> <tr><td>T₉</td><td>9.53 abc</td><td>58.25 abc</td><td>16.57 bc</td><td>4.63 a</td><td>219 abc</td></tr> <tr><td>LSD_{0.05}</td><td>2.5</td><td>15</td><td>4.16</td><td>0.7</td><td>10.6</td></tr> </tbody> </table> Means followed by similar letter(s) do not differ significantly at P_{0.05} Table 2. Economize Nitrogen Fertilizer in Spinach Production <table border="1"> <thead> <tr> <th>Treat ment</th><th>Value of Produce</th><th>Cost of Production</th><th>Net Return</th></tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Treatments	Plant Height (cm)	Number of Leaves per Spinach	Fresh Weight (g)	Dry Weight (g)	Biological Yield (g pot ⁻¹)	T ₁	5.88 d	25.5 d	8.52 d	3.40 c	202 d	T ₂	7.17 cd	62.75 ab	15.79 bc	4.30 ab	216 bc	T ₃	8.33 cd	53.50 bc	14.12 c	4.28 ab	223 ab	T ₄	7.79 cd	54.50 abc	14.32 c	3.90 bc	213 c	T ₅	10.99 ab	54.00 abc	17.63 bc	4.43 ab	225 abc	T ₆	11.54 a	68.75 a	22.37 a	4.64 a	227 a	T ₇	8.67 bc	65.50 ab	19.41 ab	4.29 ab	215 bc	T ₈	9.66 abc	36.25 c	16.59 bc	4.17 ab	216 bc	T ₉	9.53 abc	58.25 abc	16.57 bc	4.63 a	219 abc	LSD _{0.05}	2.5	15	4.16	0.7	10.6	Treat ment	Value of Produce	Cost of Production	Net Return				
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		s	(Rs. in Million)	(Rs. in Million)			(Rs. in Million)
				Cost of produce	Cost of Chemicals	Total	
		T ₁	12.12	0.01	-	0.01	12.11
		T ₂	12.96	0.01	0.01	0.02	12.94
		T ₃	13.38	0.01	0.05	0.06	13.32
		T ₄	12.78	0.01	0.26	0.27	12.51
		T ₅	13.50	0.01	0.08	0.09	13.41
		T ₆	13.62	0.01	0.19	0.20	13.60
		T ₇	12.90	0.01	0.26	0.27	12.63
		T ₈	12.96	0.01	0.47	0.48	12.48
		T ₉	12.14	0.01	0.26	0.27	11.87