

and yield attributes and thus resulted in better yield in the first picking. Also, the variations in interaction effect of $S \times F$ on net return were found to be significant (Table 3). The combination of S_2F_2 ($65 \text{ cm} \times 12 \text{ cm} \times 150\% \text{ RDF}$) resulted in the maximum net returns indicating that the use of closer plant spacing and higher fertilizer application had more baby corn yield. Higher plant population demands more amounts of nutrient and this might have been fulfilled under 150% RDF condition.

On the basis of the experimental findings, sowing of hybrid cultivar at 65 cm row to row and 12cm plant to plant spacing with 180 kg N/ha, 90 kg P_2O_5 /ha and 60 kg K_2O /ha be used for obtaining maximum net return of baby corn under agro-climatic conditions of eastern region of Gangetic plains of India.

REFERENCES

- MoA&FW. 2017. *Agricultural Statistics at a Glance*, Department of Agriculture, Cooperation & Farmers Welfare Directorate of Economics & Statistics. Ministry of Agriculture & Farmers Welfare, Government of India, New Delhi.
- FAO/WHO. 2005. Codex Standard Codex standard for baby corn (Codex Stan 188) <http://www.codexalimentarius.net>.
- Kumar, R., Bohra, J.S., Singh, A.K. and Kumawat, N. 2015. Productivity, profitability and nutrient-use efficiency of baby corn (*Zea mays* L.). *Indian Journal of Agronomy* **60**(2): 285–290.
- Kumari, A. 2015. Planting geometry effects on productivity of baby corn (*Zea mays* L.) varieties. M.Sc. thesis. Telangana State Agricultural University Rajendranagar, Hyderabad 500 030, India.
- Lucianetti, A.A.F. and Bellettini, S. 2020. Effect of row spacing and seedling rate on baby corn production. *Semina: Ciências Agrárias, Londrina* **41**(6): 2,857–2,872.
- Manea, M., Sen, A., Kumar, A., Upadhyay, P.K., Singh, Y., Srivastava, V.K. and Singh, R.K. 2015. Performance of baby corn (*Zea mays*) under different fertility levels and planting methods and its residual effect on sorghum (*Sorghum bicolor*). *Indian Journal of Agronomy* **60**(1): 45–52.
- Rani, R.R.K., Sheoran, S.P.G., Kaith, S. and Sharma, A. 2017. Baby Corn: A Wonderful Vegetable. *International Journal of Science, Environment and Technology* **6**(2): 1,407–1,412.
- Shweta, Duhan, D.S., Kaur, A. and Anurag. 2017. Effect of plant densities on baby corn yield. *Research Journal of Agricultural Sciences* **8**(1): 123–125.
- Singh, G., Kumar, S., Singh, R. and Singh, S.S. 2015. Growth and yield of baby corn (*Zea mays* L.) as influenced by varieties, spacing and dates of sowing. *Indian Journal of Agricultural Research* **49**(4): 353–357.
- Singh, M.K., Singh, R.N., Singh, S.P., Yadav, M.K. and Singh, V.K. 2010. Integrated nutrient management for higher yield, quality and profitability of baby corn (*Zea mays*). *Indian Journal of Agronomy* **55**(2): 100–104.
- Thavaprakash, N.K., Velayudham and Muthukumar, V.B. 2006. *Baby Corn*. Agro Tech Publishers, Udaipur, Rajasthan, India.
- USDA. 2019. Foreign Agricultural Service, Office of Global Analysis, 1400 Independence Avenue, SW Mail Stop 1001 Washington, DC 20250

Effect of Organic and Inorganic Fertilizers on Growth, Yield and Economics of Hybrid Maize (*Zea mays* L.)

HARMANPREET KAUR¹, PRATIMA VAIDYA² AND NEEHARIKA PARMAR³

Maharishi Markandeshwar University, Sadopur, Ambala, Haryana 134 007

Received: September 2020; Revised accepted: December 2020

ABSTRACT

An experiment was conducted during the rainy (*khari*) season of 2019 at Sadopur, Haryana, to study the effect of organic and inorganic fertilizers on growth, yield and economics of hybrid maize (*Zea mays* L.) production. The experiment was laid out in randomized block design, replicated thrice, during August–December 2019. The results revealed that 75% recommended dose of fertilizer + vermicompost @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha resulted in maximum yield attributes, i.e. cobs, grains/cob, 1,000-seed weight and net returns, and this treatment was found to be best integrated nutrient-management option for higher productivity of hybrid maize.

Key words: Inorganic fertilizers, Organic fertilizers, Plant growth, Economics, Yield attributes

In India, maize is largely grown as a rainy season (*khari*) crop and accounts for about 10% of total cereal grain production. Maize is cultivated in an area of 9.2 million ha, having production of 27.8 million tonnes with a productivity of 2,965 kg/ha (ICAR-IIMR, 2019).

The productivity of cereals is largely dependent on their nutrient management. Inorganic fertilizers are applied to fulfil the plant requirements for nitrogen, phosphorus and zinc sulfate, but excessive use of chemical fertilizers deteriorates the soil fertility by affecting the physical, chemical and biological properties. Therefore, combined use of chemical fertilizers along with various organic sources is capable of improving soil quality and crop productivity on a long-term basis. Therefore, present study was conceptualized to examine the effect of organic and inorganic fertilizer combinations on growth and yield parameters of maize.

The experiment was conducted at the research field of the Maharishi Markandeshwar University, Sadopur, Ambala, Haryana (30°22' N, and 76°46' E and at an altitude of 264 m above mean sea-level). The area represents the tropical and semi-arid climate and is characterized by a

warm temperate climate. The study was conducted with 8 treatments of organic (vermicompost) and inorganic fertilizers (N, P, K and Zinc) with the objective of identifying efficient treatment for attaining higher yield. The soil was a sandy loam, low in available nitrogen, phosphorus, and potassium. The experiment was conducted in randomized block design with 3 replications. The treatments were T₁, Control; T₂, 100% recommended dose of fertilizer (RDF) N; T₃, 100% recommended dose of fertilizer NP; T₄, 100% recommended dose of NPK; T₅, 75% recommended dose of fertilizer + ZnSO₄ @ 25 kg/ha; T₆, 75% recommended dose of fertilizer + vermicompost @ 2.5 t/ha; T₇, vermicompost @ 2.5 t/ha; T₈, 75% recommended dose of fertilizer + vermicompost @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha. The recommended dose of fertilizer 120, 60 and 40 kg/ha of nitrogen, phosphorus and potassium was applied for maize. Full quantities of phosphorus and potassium fertilizers were applied basal at the time of sowing. In case of nitrogen, 50% of nitrogen was applied basal, while the remaining 50% nitrogen was applied in 2 splits –at the first and second irrigation. Zinc was applied as zinc sulfate (ZnSO₄). Vermicompost (1.15% N, 0.86% P and 0.60% K) was applied to the plots as per treatments at 10 days prior to the sowing of crops. The seeds of maize variety 'DKC 7074' (Monsanto) were sown in ridges at 60 cm apart and plant-to-plant spacing was 20 cm.

The data pertaining to the accumulation of dry matter (g/plant) at harvesting time presented in Table 1, revealed that the maximum dry matter of plant was recorded with the application of 100% RDF which was at par with 75%

Based on a part of M.Sc. Thesis of the first author, submitted to the Maharishi Markandeshwar University, Ambala, Haryana in 2019 (unpublished)

¹Corresponding author's Email: harmankaur1gh@gmail.com

^{1,3}M.Sc. Student (Agronomy), ²Assistant Professor, Department of Agriculture Maharishi Markandeshwar University, Sadopur, Ambala, Haryana 134 007

RDF + ZnSO₄ @ 25 kg/ha and 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha. The highest leaf-area index of 4.80 was recorded in treatment T₈ (75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha), being at par with T₄ (100% RDF) (Table 1). The plant height significantly increased with application of organic and inorganic fertilizers. The maximum plant height at harvesting was observed in T₈ with the values of 223.55 cm, which were significantly higher than the other treatments. Minimum plant height was observed in the control where no organic and inorganic fertilizers were used. More plant height in T₈ might be due to the fact that nitrogen from chemical fertilizer promoted the plant growth at early stages, whereas organic sources of nutrition improved the growth at later stages. Similar results were obtained by Mahato *et al.* (2020) where application of 75% RDF + vermicompost @ 2 t/ha + foliar application of ZnSO₄ @ 0.5% resulted in the taller plants.

The highest number of plants was observed in treatment T₈, (75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha), which was at par with treatments T₄, (100% RDF) and T₅, (75% RDF + ZnSO₄ @ 25 kg/ha). However the lowest plant population was recorded in the control. Grains/cob

were significantly influenced by the treatments (Table 2). Treatment T₈, 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha, resulted in the highest number of grains/cob, being at par with T₄, 100% RDF and T₅, 75% RDF + ZnSO₄ @ 25 kg/ha with the respective values of 329 and 326 which were significantly superior to rest of the treatments. The test weight was maximum with T₈, 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha and T₅, 75% RDF + ZnSO₄ @ 25 kg/ha, i.e. 233 g.

The maximum grain yield (6.80 t/ha) was recorded under T₈ treatment with application of 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha (Table 3) which was at par with T₄ (100% RDF). Similar results were reported by Kumar and Ahlawat (2004), Ali *et al.* (2011), Mahapatra *et al.* (2018), Bhatt *et al.* (2020) and Mahato *et al.* (2020). The minimum grain yield (3.13 t/ha) was recorded in the control. The result can be owing to adequate availability of the nutrients to the crop which enhanced growth and yield attributes, increased cobs/plant, number of grains/cobs, and the final plant population contributed to higher yield. Treatment 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha resulted in the highest biological yield which was at par with

Table 1. Effect of organic and inorganic fertilizers on dry-matter accumulation, leaf-area index and plant height

Treatment	Dry-matter accumulation (g/plant)	Leaf-area index	Plant height at harvesting
T ₁ , Control	101.9	3.20	176.2
T ₂ , 100% RDF N	118.8	4.43	213.4
T ₃ , 100% RDF NP	118.0	4.46	217.8
T ₄ , 100% RDF	123.3	4.70	219.4
T ₅ , 75% RDF + ZnSO ₄ @ 25 kg/ha	119.5	4.48	217.0
T ₆ , 75% RDF + VC @ 2.5 t/ha	112.0	4.45	219.8
T ₇ , Vermicompost @ 2.5 t/ha	106.2	3.72	207.2
T ₈ , 75% RDF + VC @ 2.5 t/ha + ZnSO ₄ @ 25 kg/ha	127.0	4.80	223.5
SEm±	1.97	0.09	0.98
CD (P=0.05)	5.99	0.26	2.98

RDFN, Recommended dose of fertilizer N; recommended dose of fertilizer NP; VC, vermicompost

Table 2. Effect of organic and inorganic fertilizers on yield parameters of maize

Treatment	Cobs/plant	Grains/cob	1,000-grain weight(g)	Final plant population/ha (× 10 ² /ha)
T ₁ , Control	1.17	270	230	491
T ₂ , 100% RDF N	1.57	310	232	506
T ₃ , 100% RDF NP	1.50	316	232	507
T ₄ , 100% RDF	1.89	326	231	518
T ₅ , 75% RDF + ZnSO ₄ @ 25 kg/ha	1.57	321	233	522
T ₆ , 75% RDF + VC @ 2.5 t/ha	1.61	315	232	511
T ₇ , Vermicompost @ 2.5 t/ha	1.37	302	230	501
T ₈ , 75% RDF + VC @ 2.5 t/ha + ZnSO ₄ @ 25 kg/ha	2.00	329	233	535
SEm±	0.12	4.40	0.36	4.22
CD (P=0.05)	0.35	13.36	1.09	1,370.33

100% RDF. Consequent upon the proportionate change in all the 3 parameters, harvest index remained unaffected due to different treatments.

Data on economics of different treatments are presented in Table 4. Data revealed that, the plot receiving 100% RDF gave the maximum net returns and maximum benefit: cost ratio and was statistically at par with 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha. The cost of cultivation varied according to the application of fertilizers. Among fertilizer levels, the cost of cultivation was the minimum in the control treatment and increased with increase in fertilizer level to T₄, 100% RDF. The cost of cultivation of the fertilizer levels with vermicompost was higher. The maximum cost of cultivation was with the application of T₈, 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha. Significantly higher gross returns ($1,156 \times 10^2$ /ha) were recorded with the application of T₈, 75% RDF + VC @ 2.5 t/ha + ZnSO₄ @ 25 kg/ha, which was statistically at par with the T₄, 100% RDF. Similar results were reported by Ashoka *et al.* (2008), Mahapatra *et al.* (2018) Mahato *et al.* (2020), where the gross returns and net returns were the maximum with integrated nutrient management as compared to inorganic mode of nutrition.

The application of recommended dose of NPK with

vermicompost and zinc sulphate gave the best results with respect to growth and yield parameters with higher net income. The results showed that, the application of nitrogen from chemical fertilizers promoted the plant growth at early stages, whereas organic sources of nutrition improved the growth at later stages. Application of vermicompost exerted the positive influence on growth of plants owing to presence of readily available nutrients and growth-enhancing substances, which resulted in better crop production. Thus, application of combined use of organic and inorganic fertilizers is beneficial in areas where there is deficiency of essential minerals in soil.

REFERENCES

- Ali, K., Munsif, F., Zubair, M., Hussain, Z., Shahid, M. and Din, I.U. 2011. Management of organic and inorganic nitrogen for different maize varieties. *Sarhad Journal Agriculture* **27**(4): 525-529.
- Ashoka, P., Pujari, B.T., Hugar, P.S., Desai, B.K. 2008. Effect of micronutrients with or without organic manures on yield of baby corn (*Zea mays* L.)-chickpea (*Cicer arietinum* L.) sequence. *Karnataka Journal of Agricultural Sciences* **21**(4): 485-487.
- Bhatt, K.R., Bhattachan, K.B., Marahatta, S. and Adhikari, J.B. 2020. Growth and profitability of maize (*Zea mays* L.) under

Table 3. Effect of organic and inorganic fertilizers on yield of maize

Treatment	Grain yield (t/ha)	Stover yield (t/ha)	Biological yield (t/ha)	Harvest index (%)
T ₁ , Control	3.13	5.30	8	37.1
T ₂ , 100% RDF N	4.93	6.73	11.6	42.6
T ₃ , 100% RDF NP	4.81	7.10	11.91	40.3
T ₄ , 100% RDF	6.39	8.04	14.43	44.2
T ₅ , 75% RDF + ZnSO ₄ @ 25 kg/ha	5.27	7.66	12.93	40.7
T ₆ , 75% RDF + VC @ 2.5 t/ha	5.20	7.15	12.34	42.1
T ₇ , Vermicompost @ 2.5 t/ha	4.16	5.87	10.04	41.4
T ₈ , 75% RDF + VC @ 2.5 t/ha + ZnSO ₄ @ 25 kg/ha	6.80	8.33	15.13	45.3
SEm±	0.35	0.34	0.73	1.96
CD (P=0.05)	1.08	1.03	2.23	NS

Table 4. Effect of organic and inorganic fertilizers on economics of maize

Treatment	Cost of cultivation (×10 ³ ₹/ha)	Gross returns (×10 ³ ₹/ha)	Net returns (×10 ³ ₹/ha)	Benefit: cost ratio
T ₁ , Control	31.1	53.2	22.2	0.71
T ₂ , 100% RDF N	41.3	83.8	42.4	1.03
T ₃ , 100% RDF NP	40.3	81.7	38.4	1.02
T ₄ , 100% RDF	44.6	108.8	64.0	1.44
T ₅ , 75% RDF + ZnSO ₄ @ 25 kg/ha	40.6	86.5	44.8	1.05
T ₆ , 75% RDF + VC @ 2.5 t/ha	48.1	88.4	38.3	0.84
T ₇ , Vermicompost @ 2.5 t/ha	45.4	70.7	25.2	0.60
T ₈ , 75% RDF + VC @ 2.5 t/ha + ZnSO ₄ @ 25 kg/ha	55.4	115.6	58.2	1.09
SEm±	-	6.9	4.6	0.09
CD (P=0.05)	-	20.9	14.1	0.36

- sole and combined applications of different organic and inorganic nutrient management at Rampur, Chitwan, Nepal. *Journal of Biological Today's World* **9**(2): 214.
- Kumar, V. and Ahlawat, I.P.S. 2004. Carry-over effect of biofertilizers and nitrogen applied to wheat (*Triticum aestivum*) and direct applied N in maize (*Zea mays*) in wheat–maize cropping system. *Indian Journal of Agronomy* **49**(4): 233–236.
- Mahapatra, A., Barik, A.K. and Mishra, G.C. 2018. Integrated nutrient management on babycorn (*Zea mays* L.). *International Journal of Bio-resource and Stress Management* **9**(1): 44–48.
- Mahato, M., Biswas, S. and Dutta, D. 2020. Effect of integrated nutrient management on growth, yield and economics of hybrid maize (*Zea mays* L.). *Current Journal of Applied Science and Technology* **39**(3): 78–86.

LIST OF LIFE MEMBERS OF ISA – 2020

Executive Council of the Indian Society of Agronomy extends hearty welcome to the life members of 2020 of Indian Society of Agronomy and solicits active participations/contributions for the progress of the Society.

V.K. Singh

Secretary,

The Indian Society of Agronomy

1. Kirmani, M. Jyostna, **AP/2020/3075**, Nandyal, Andhra Pradesh
2. Madavi, B., **AP/2020/3076**, Warangal, Andhra Pradesh
3. Priya, Talupuru Bhagavatha, **AP/2020/3077**, Chittoor, Andhra Pradesh
4. Naveen, Jami, **A/2020/3078**, Jorhat, Assam
5. Jain, Anand Kumar, **B/2020/3079**, Buxar, Bihar
6. Kishor, Kaushal **B/2020/3080**, Samastipur, Bihar
7. Kumar, Santosh, **B/2020/3081**, Patna, Bihar
8. Kumar, Uday, **B/2020/3082**, Buxar Bihar
9. Parihar, Ritesh Kumar, **B/2020/3083**, Samastipur, Bihar
10. Rana, Lalita, **B/2020/3084**, Samastipur, Bihar
11. Seema, **B/2020/3085**, Bhagalpur, Bihar
12. Banjara, Tej Ram, **CG/2020/3086**, Surajpur, Chhattisgarh
13. Fatima, Ayesha, **D/2020/3087**, ICAR-IARI, New Delhi
14. Jangir, Rameti, **D/2020/3088**, ICAR-IARI, New Delhi
15. Kumar, Bipin, **D/2020/3089**, ICAR-IARI, New Delhi
16. Kushwaha, Manish, **D/2020/3090**, ICAR-IARI, New Delhi
17. Padhan, Smruti Ranjan, **D/2020/3091**, ICAR-IARI, New Delhi
18. Pratap, Vijay, **D/2020/3092**, ICAR-IARI, New Delhi
19. Singh, Tarunendu, **D/2020/3093**, IFFCO, Saket Place, New Delhi
20. Gopibhai, Gamar Prakashkumar, **G/2020/3094**, Wanakbori Gujarat
21. Panchal, Jalpa, **G/2020/3095**, Anand, Gujarat
22. Swami, B.N., **G/2020/3096**, Ahmedabad Gujarat
23. Thesiya, Nayan, **G/2020/3097**, Navsari, Gujarat
24. Paramesh, V., **Goa/2020/3098**, ICAR-CCARI, Goa
25. Sharma, Chandan, **HP/2020/3099**, Kangra, Himachal Pradesh
26. Gupta, Vikas, **JK/2020/3100**, SKUAST, Jammu and Kashmir
27. K. Sreelakshmi, **Ke/2020/3101**, Ernakulam, Kerala
28. Sadhukhan, Rahul, **Mn/2020/3102**, Imphal, Manipur
29. Chavan, Asha, **MS/2020/3103**, Parbhani, Maharashtra
30. Didal, Vijay Kumar, **MS/2020/3104**, Shirpur Maharashtra
31. Pradhan, Aliza, **MS/2020/3105**, Pune, Maharashtra
32. Raut, Santosh Dnyanoba, **MS/2020/3106**, Beed, Maharashtra
33. Yadav, Aparna, **MS/2020/3107**, Khed, Maharashtra
34. Maitra, Sagar, **O/2020/3108**, Paraakhemundi, Odisha
35. Barod, Niranjan, **R/2020/3109**, Alwar, Rajasthan
36. Choudhary, Rakesh, **R/2020/3110**, Jodhpur Rajasthan
37. Gathala, Mahesh Kumar, **R/2020/3111**, Jaipur, Rajasthan
38. Kantwa, Chatra Ram, **R/2020/3112**, Jaipur, Rajasthan
39. Mali Hansram, **R/2020/3113**, Alwar, Rajasthan
40. Anbarasu Mariyappillai, **TN/2020/3114**, Kallakurichi, Tamil Nadu
41. Kumar, Saravana, **TN/2020/3115**, Tiruppur Tamil Nadu
42. Ramesh, T., **TN/2020/3116**, Trichy, Tamil Nadu
43. Rathika, S., **TN/2020/3117**, Trichy, Tamil Nadu
44. S. Anusha, **TN/2020/3118**, Coimbatore, Tamil Nadu
45. Selvakumar, S., **TN/2020/3119**, Coimbatore, Tamil Nadu
46. Bavaji, Gudi Shobha Rathod, **TS/2020/3120**, Jagtial, Telangana State
47. Bharath, T., **TS/2020/3121**, Nalgonda, Telangana State
48. Bhargavi, Boda Manju, **TS/2020/3122**, Nizamabad, Telangana State
49. Chauhan, Sreedhar, **TS/2020/3123**, Aditabad, Telangana State
50. Goverdhan, Manthathi, **TS/2020/3124**, Hyderabad, Telangana State
51. Gudi, Satyanarayana Reddy, **TS/2020/3125**, Jagtial, Telangana State
52. Hussain, Syed Ahmed., **TS/2020/3126**, Hyderabad, Telangana State
53. Jannu, Narendar, **TS/2020/3127**, Karimnagar, Telangana State
54. Kadasiddappa, M.M., **TS/2020/3128**, Hyderabad, Telangana State
55. Kumar, Rajap Shiva, **TS/2020/3129**, Hyderabad, Telangana State
56. Lata, A. Madhavi, **TS/2020/3130**, Hyderabad, Telangana State
57. Laxmi, Golla Vijaya, **TS/2020/3131**, Basanthpur, Telangana State
58. Madhu, Moguloju, **TS/2020/3132**, Warangal, Telangana State
59. Mahadevappa, S.G., **TS/2020/3133**, Hyderabad, Telangana State
60. Mamatha, K., **TS/2020/3134**, Palem, Telangana State
61. Mudavath, M. Parimal Kumar, **TS/2020/3135**, Palem, Telangana State
62. Murali, B., **TS/2020/3136**, Hyderabad, Telangana State
63. Nagabushanam, U., **TS/2020/3137**, Warangal, Telangana State
64. Naganjali, Kesireddy, **TS/2020/3138**, Kothagudem, Telangana State
65. Narendar, G., **TS/2020/3139**, Bhuvangiri, Telangana State
66. Nathan, J.K. Revanth, **TS/2020/3140**, Hyderabad, Telangana State
67. Padmaja, B., **TS/2020/3141**, Hyderabad, Telangana State
68. Prathikantam, Spandana Bhatt, **TS/2020/3142**, Hyderabad, Telangana State
69. Ramana, Maparla Venkata, **TS/2020/3143**, Hyderabad, Telangana State
70. Ramesh, Ch., **TS/2020/3144**, Hyderabad, Telangana State
71. Rani, J.S. Sudha, **TS/2020/3145**, Hyderabad Telangana State
72. Ranjitha, P. Sri, **TS/2020/3146**, Kammam, Telangana State
73. Rekha, K. Bhanu, **TS/2020/3147**, Hyderabad, Telangana State
74. Sathish, Akarapu, **TS/2020/3148**, Siddipet, Telangana State
75. Sridhar, K., **TS/2020/3149**, Palem, Telangana State
76. Suresh, K., **TS/2020/3150**, Hyderabad, Telangana State
77. Swathi, Koneni, **TS/2020/3151**, Kothagudem Distt., Telangana State
78. Swetha, Dasari, **TS/2020/3152**, Tornala, Telangana State
79. Talla, Arunbabu, **TS/2020/3153**, Hyderabad Telangana State
80. Tara, Nalini Nune, **TS/2020/3154**, Hyderabad, Telangana State
81. Thirupathi, Islavath, **TS/2020/3155**, Mancherial, Telangana State
82. Vani, K.P., **TS/2020/3156**, Hyderabad, Telangana State
83. Vijay, J., **TS/2020/3157**, Warangal, Telangana State
84. Dewangan, Savita, **UP/2020/3158**, Mirzapur, Uttar Pradesh
85. Dubey, Sauhard, **UP/2020/3159**, Bulandshahr Uttar Pradesh
86. Gupta, Gaurendra, **UP/2020/3160**, Jhansi, Uttar Pradesh
87. Singh, Amit Kumar, **UP/2020/3161**, Banda, Uttar Pradesh
88. Singh, Rajeev Kumar, **UP/2020/3162**, Jalaun, Uttar Pradesh
89. Singh, Sanjeev, **UP/2020/3163**, Azamgarh Uttar Pradesh
90. Suryavanshi, Priyanka, **UP/2020/3164**, Lucknow, Uttar Pradesh
91. Jana, Kalyan, **WB/2020/3165**, Nadia, West Bengal
92. Mitra, Biplob, **WB/2020/3166**, Coochbehar West Bengal

LIST OF REVIEWERS OF INDIAN JOURNAL OF AGRONOMY – 2020

I sincerely acknowledge with thanks to the contributions of the reviewers of Indian Journal of Agronomy, which has enabled us to bring the journal well in time and request for the similar contributions in future too.

V.K. Singh

Secretary

The Indian Society of Agronomy

Dr G. Ravindra Chary, ICAR-CRIDA, Hyderabad, A.P.
Dr A.S. Bhanvadia, RRS, AAU, Anand, Gujarat
Dr A.V. Ramanjaneyulu, PJTSAU, Siddipet, Telangana
Dr Amal Ghosh, ICAR-IARI, New Delhi
Dr Anchal Das, ICAR-IARI, New Delhi
Dr Anil K. Choudhary, Shimla, Himachal Pradesh
Dr Anup Das, ICAR-RC for NEH Region, Agartala, Tripura
Dr Asha Ram, ICAR-CARI, Jhansi, U.P.
Dr B. Gangaiah, ICAR-RRI, Hyderabad, Telangana State
Dr B.M. Pandey, ICAR-VPKAS, Almora, Uttarakhand
Dr Bipin Kumar, WTC, ICAR-IARI, New Delhi
Dr C.P. Nath, ICAR-IIPR, Kanpur, Uttar Pradesh
Dr C.S. Praharaj, ICAR-IIPR, Kanpur, Uttar Pradesh
Dr D. Blaise, ICAR-CICR, Nagpur, M.S.
Dr D. Esther Shekinah, East Troy, WI, USA
Dr Dileep Kumar, IISR, Lucknow, U.P.
Dr E.V.S. Prakasrao, Bengaluru, Karnataka
Dr G.A. Rajanna, ICAR-IARI, New Delhi
Dr Gulab Singh Yadav, ICAR-IARI, New Delhi
Dr Guriqbal Singh, PAU, Ludhiana, Punjab
Dr H.L. Sharma, HPKV, Himachal Pradesh
Dr Hari Ram, PAU, Ludhiana, Punjab
Dr Hirak Banerjee, Kalyani, Nadia, W.B.
Dr Ishwar Singh, NBPGR, New Delhi
Dr J.K. Bisht, Almora, Uttarakhand
Dr J.S. Mishra, ICAR-DWR, Jabalpur, M.P.
Dr Jayanta Deka, AAU, Assam
Dr K. Ramesh, ICAR-IIOR, Hyderabad, Telangana
Dr K.A. Gopinath, CRIDA, Hyderabad, Telangana
Dr K.G. Mondal, ICAR-IIWM, Bhubaneswar, Odisha
Dr K.S. Rana, ICAR-IARI, New Delhi
Dr Kapila Shekhawat, ICAR-IARI, New Delhi
Dr M.K. Rapolu, IIRR, Rajendranagar Hyderabad, A.P.
Dr M.V. Venugopalan, ICAR-CICR, Nagpur, M.S.
Dr Magan Singh, NDRI, Karnal, Haryana
Dr Mangal Deep Tuti, ICAR-IIRR, Hyderabad, Telangana
Dr Md. Hashim, IARI, Pusa Samastipur, Bihar
Dr Moirangthem Thoithoi Devi, ICAR-RC, Mizoran
Dr Mukesh Choudhary, ICAR-IGFRI, Jahansi, Uttar Pradesh
Dr N. Ravisankar, ICAR-IIFSR, Modipuram, U.P.

Dr N.K. Jain, ICAR-IARI, New Delhi
Dr N.L. Joshi, CAZRI, Udaipur, Rajasthan
Dr Narendra Kumar, ICAR-IIPR, Kanpur, U.P.
Dr P. Devasenapathi, TNAU, Coimbatore, Tamil Nadu
Dr Prakash Chand Ghasal, ICAR-IIFSR, Meerut, U.P.
Dr Parveen Kumar, ICAR, New Delhi
Dr R.H. Wanjari, ICAR-IISS, Bhopal, M.P.
Dr R.P. Meena, ICAR-IIW&BR, Karnal, Haryana
Dr R.S. Bana, ICAR-IARI, New Delhi
Dr Raghuvendra Madar, ICAR-IISR, Indore, M.P.
Dr Raihana Habib Kanth, SKUAST, Jammu & Kashmir
Dr Rajeew Kumar, GBPUAT, Pantnagar, Uttarakhand
Dr Rajendra Prasad Meena, VPKAS, Almora, Uttarakhand
Dr Rakesh Kumar Verma, ICAR-IISR, Indore, M.P.
Dr Ram Lal Choudhary, ICAR DRM, Bharatpur, Rajasthan
Dr Rishi Raj, ICAR-IARI, New Delhi
Dr S.C. Tripathi, ICAR-IIWBR, Karnal, Haryana
Dr S.D. Billore, ICAR-IISR, Indore, M.P.
Dr S.K. Khokhar, CCS HAU, Hisar, Haryana
Dr S.K. Rautaray, ICAR-IIWM, Bhubaneswar, Odisha
Dr S.K. Sarangi, ICAR-CSSRI, RRS, 24 Parganas, W.B.
Dr S.P. Singh, IAS, BHU, Varanasi, U.P.
Dr S.R. Kantwa, ICAR-IGFRI, Jhansi, U.P.
Dr S.S. Rathore, ICAR-IARI, New Delhi
Dr S.S. Tomar, RVSKVV, Gwalior, M.P.
Dr S.S. Walia, PAU, Ludhiana, Punjab
Dr Sanjeev Kumar, NDRI, Karnal, Haryana
Dr Saroj Kumar Prasad, BHU, Varanasi, U.P.
Dr Shiva Dhar, ICAR-IARI, New Delhi
Dr Soumitra Das, IZA, New Delhi
Dr Subhash Babu, ICAR-IARI, New Delhi
Dr Sushmita Munda, ICAR-NRRI, Cuttack, Odisha
Dr T.K. Das, ICAR-IARI, New Delhi
Dr Teekam Singh, ICAR-IARI, New Delhi
Dr V. Paramesh, ICAR-CCARI, Goa
Dr V.P. Singh, ICAR-IISR, Lucknow, U.P.
Dr V.S. Pawar, Nashik, M.S.
Dr Vijay Pooniya, ICAR-IARI, New Delhi
Dr Yogeshwar Singh, RLB CAU, Jhansi, U.P.



REVISED GUIDELINES FOR CONTRIBUTORS

Indian Journal of Agronomy (IJA) is a quarterly publication of the Indian Society of Agronomy publishing original research papers, review articles and short communications on various aspects of agronomy of field crops and farming systems. Articles must demonstrate new scientific insight, original technologies or novel methods that have general application and relevance to field crops. The detailed guidelines (available on our Society website www.isa-india.in) for preparation of articles by the authors are given below.

1. AIMS AND SCOPE

- 1.1 The original research papers should report the results of original research based on field experiments and should not have been previously published elsewhere. Short communication is a concise but complete description of a limited investigation, which will not be included in a later paper. Short Communications should be as completely documented, both by reference to the literature and description of the experimental procedures employed, as a regular paper. Short Communications, based M.Sc. Agronomy thesis results and involve research of one year is also considered.
- 1.2 Review articles are specifically solicited by the Editorial Board. However, authors wishing to contribute a review article on their own, based on their standing in the relevant field, may contact the Secretary of the Indian Society of Agronomy or the Chief Editor with a broad outline before submitting the manuscript.
- 1.3 The articles submitted for publication in the Journal should contain data not older than 5 years on the date of their receipt in the Society office. The period shall be reckoned from the following 31 December and 31 July after the completion of the field experimentation.
- 1.4 The article should present a complete picture of the investigation made and should not be split into parts. However, in exceptional cases, where a large volume of in-depth data has been collected, based on multi-season experimentation, the article can be split into two parts, with the same main title and a different short sub-title. In such articles, proper continuity should be maintained in presentation of information, and all the parts should be submitted together.
- 1.5 Each article should be written in English clearly, objectively and concisely. All the statements should

be clear, unambiguous, and to the point. One should aim at short meaningful sentences while maintaining continuity of expression.

- 1.6 Articles should be suitably divided into the following sub-sections: TITLE, AFFILIATION, ABSTRACT, KEY WORDS, INTRODUCTION, MATERIALS AND METHODS, RESULTS AND DISCUSSION, CONCLUSION, and REFERENCES. Tables and figures should be appended at the end of the text.
- 1.7 Research articles will be published only when they are based on data of a minimum of 2 years/seasons. Further, if the experiments were conducted on the same site and the results were similar in the two years of study, it is suggested that data be pooled over 2 years to save time to the reader and space in the Journal. Also, it will be easier to discuss the results. Articles reporting pooled data and only a few tables will be given priority for publication. For experiments conducted over a period of more than 2 years, year-wise data may be given only when the results are variable from year to year and there is good discussion of the reasons causing these variations. Short communications based on one year results (M.Sc. Thesis) will also be accepted, provide they do not contain more than two short tables and the entire manuscript does not exceed 6 pages (typed double space, including tables). Short notes will have TITLE AFFILIATION, ABSTRACT, and KEY WORDS but no subheadings in the subsequent text.

2. TITLE PAGE

- 2.1 Title of the article should be informative but concise, and should not contain abbreviations. It should reflect the content of the article to facilitate key word indexing and information retrieval. A good title briefly identifies the subject, indicates the purpose of study and introduces key terms and concepts. It should be set in lower case and bold letters, using one font size higher than the remaining text (Times New Roman, 12 Font, double space). Use of words such as 'Effect of ...' or 'Influence of' in the title should be avoided.
- 2.2 Wherever relevant, the title should indicate the scientific name of the crops or organisms studied without mentioning the authority. Authority should be given at the first mention of the name in the subsequent text.
- 2.3 A short title, not exceeding 6 words or 50

characters, should also be given for running headlines. This should cover the main theme of the article.

- 2.4 Byline should contain, in addition to the names and initials of authors (in capital letters), the place (in italics) where research was conducted and not where the authors are currently working. Change of address for any author should be given as a footnote. Complete address including the name of laboratory / department, institution / university, city / town / district, state and PIN code should be furnished.
- 2.5 Email ID of the corresponding author should be given as a footnote. It will facilitate correspondence and quick processing of articles.

3. ABSTRACT

- 3.1 Second page should start again with the title of the article and then be followed by the abstract. The abstract should state briefly (not exceeding 200 words) the purpose of the research, brief methodology, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided.
- 3.2 The complete scientific name (including authority) for plants and other organism, and full name of any abbreviation or symbol used should be given at their first mention.
- 3.3 Key words (6-8) should be given at the end of the abstract in alphabetical order (each key word to start with capital letter), separated by a comma. These words should indicate the most important materials, operations or ideas covered in the article.
- 3.4 Indexing journals place a great emphasis on the quality of the abstract in the selection of articles for abstracting. If properly prepared, they reproduce it verbatim. Hence, due attention should be paid in preparing the abstract.

4. INTRODUCTION

- 4.1 The word 'Introduction' should not be typed as a heading but the beginning of the main text should be side marketed by putting a one cm long line below the abstract in the middle.
- 4.2 It should be brief and to the point, limited to the statement of the problem that justifies the work or of the hypothesis on which it is based, and an explanation of the general approach and objectives of the study.
- 4.3 It should state the objectives of the work and

provide an adequate background including relevant literature which demonstrates the need for the reported study.

- 4.4 Emphasis should be given among other things on citing the literature on work done under Indian conditions and published in the previous volumes of Indian Journal of Agronomy.
- 4.5 If the methods employed in the article are new, this must be indicated.

5. MATERIALS AND METHODS

- 5.1 This part of the article should comprise the materials used in the investigation, and the methods of experimentation and analysis adopted. It should have all the requisite information for providing a clear understanding and assessment of the results reported subsequently. It should begin with information relating to period/season/year and place of study, climate or weather conditions, soil type including physicochemical properties and others as relevant to the study. While giving values for available nutrients, the method used and reference to the practical manual or book, where the method is described should be given.
- 5.2 The geographical position of the experimental site should be identified with the help of coordinates (latitude and longitude) and altitude.
- 5.3 Treatment details along with techniques and experimental design, replications, plot size etc. should be clearly indicated. The experimental design adopted should have ensured that appropriate error degrees of freedom are there. Pooling of data should be done only when year x treatment inter-action effects are not significant. Pooling of data must be avoided in dryland; rainfed experiments and fixed site experiments for entire period of experimentation. If asked, the authors must be able to give the homogeneity of error variance.
- 5.4 Use of symbols for treatments may be avoided, unless these are absolutely necessary. An abbreviation should be fully explained when first mentioned.
- 5.5 Details such as the crop variety (within single inverted commas), methodology for application of treatments, common cultivation practices including sowing, fertilization, weed management, irrigation, plant protection measures, harvest etc should be given. For cropping system experiments, it should be clearly stated as to whether the study was carried out on fixed location for the entire experimental period or the location changed every year. In rainfed

and dryland experiments, initial moisture status at sowing (and if possible, at different stages), rainfall distribution and evaporation (as a graph) should be given. If the treatments are based on moisture conservation practices (summer ploughing, manures, mulching, land configuration etc.), moisture conserved, extraction and utilization data must be given. In irrigation studies (based IW/CPE ratio), daily evaporation and rainfall data in the form of a graph along with the dates of irrigation mentioned year-wise in the text are necessary. The nutrient composition of manures (N, P, K, Fe, Zn, organic carbon content etc.) should be given. For new herbicides, mode of action should be stated.

- 5.6 A brief description of the specific observations recorded should be made. Further, the procedure for calculation of any new parameters reported should be explained along with suitable references.
- 5.7 Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.
- 5.8 Methods used for statistical analysis should be described with sufficient detail so that a reader, if equipped with the paper, the raw data and the same software, could reproduce all results reported. All statistical comparisons among treatments may be made at $P=0.05$ level of probability. Correlation and regression analysis should be given when necessary. For working out optimum economic doses, the experiment should include a control treatment.

6. RESULTS AND DISCUSSION

- 6.1 Results may be reported and discussed together to avoid duplication. The information should be divided into suitable sub-headings, typed in italics.
- 6.2 The section should not be mere repetition of the data presented in the tables and diagrams. Instead, there should be effort to interpret them suitably by indicating changes or any other derivations. In the factorial experiments, emphasis should be laid on explaining interactions.
- 6.3 While discussing the results, particular attention should be given to the problem, question or hypothesis presented in the introduction. Results should be related to the objectives. Parameters that are of little consequence for the overall objective of the study should not be described/discussed
- 6.4 Any principles, relationships and generalizations that can be supported by the results should be

elaborated.

- 6.5 Discussion should be strengthened by explaining treatment effects in terms of cause and effect relationship. Explain how the results relate to previous findings (support, contradict).
- 6.6 Scientific speculation is encouraged, but it should be reasonable and firmly founded in observations. When the results differ from previously available information, possible explanations should be given. Controversial issues should be discussed clearly and fairly.
- 6.7 The references quoted in the introduction for review and justification of the study should be suitably utilized for discussion of the results.
- 6.8 Statement like "The results are in agreement with", 'Similar results were reported by' should normally be avoided.
- 6.9 Avoid sentences with 'respectively'. For example "On an average, organic manure treatment resulted in the reduction in yields of wheat, potato and vegetables pea by 16.0, 16.8 and 12.5%, respectively, than the fertilizer application treatment." It should better be written "As compared to chemical fertilizer, organic manure application lowered the yield of wheat by 16.0%, of potato by 16.8% and of vegetable pea by 12.5%."

7. CONCLUSION

- 7.1 The main conclusions of the study may be presented in a short in this section. In no case, it should exceed more than 5 sentences.
- 7.2 The section should clearly crystallize the summary of the results obtained along with their implications in solution of the practical problems and contribution to the advancement of scientific knowledge.
- 7.3 It should suggest areas for further investigation.

8. ACKNOWLEDGEMENT

Collate acknowledgements in a separate section at the end of the article before the references. List here those individuals, Institutions and funding agencies who provided help during the research.

Declaration of competing interest

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work.

9. REFERENCES

- 9.1 The references in general must not be older than 10 years. Only in exceptional cases (e.g. in case of

a land mark work or where no suitable recent references are available) should the older work be referred to.

- 9.2 All references cited in the text must appear at the end of the article and *vice-versa*. The spellings of names and dates or years at the two places should be carefully checked.

- 9.3 The references should include names of all authors, year (not within brackets), full title of the article, full name of the journal (*in italics*) (no abbreviations), volume number (in bold), issue number (in bracket, not bold), and pages. For book or mono-graph, the name of the publisher should also be given as well as its volume, edition and relevant page range. The examples are given below.

- 9.4 The references cited together in the text should be arranged chronologically. The list of references should be arranged alphabetically on author's names, and chronologically per author.

- 9.5 References from previous volumes of Indian Journal of Agronomy and other standard scientific journals should be preferred, while those concerning unpublished data are generally avoided or mentioned as 'Personal communications' in the text. These need not be given in the reference list. A few examples for correct citation of references are given below:

9.6.1 *Research articles*

Bisht, J.K. 2009. Effect of different cropping sequences and fertility levels on the winter dual purpose food and fodder crops. *Archives of Agronomy and Soil Science* **55**(5): 515–524

- Saha, R. and Ghosh, P.K. 2010. Effect of land configuration on water economy, crop yield and profitability under rice (*Oryza sativa*)-based cropping systems in northeast India. *Indian Journal of Agricultural Sciences* **80**(1): 16–20

- Sharma, B.R., Rao, K.V., Vittal, K.P.R., Ramakrishna, Y.S. and Amarasinghe, U. 2010. Estimating the potential of rainfed agriculture in India: Prospects for water productivity improvements. *Agricultural Water Management* **97**(1): 23–30

9.6.2 *Book*

Bandyopadhyay, P.C. (Ed.) 2010. *Fertigation: Fundamentals and Applications*. 336 p. Daya Publishing House, Delhi, India.

9.6.3 *Book Chapter*

Ali, M., Singh, K.K., Pramanik, S.C. and Omar Ali, M. 2009. Cropping systems and production

agronomy. In: *The Lentil : Botany, Production and Uses*. (Erskine, W., Muehlbauer, F., Sarker, A. and Sharma, B. Eds.). pp. 213–228. CABI, Wallingford, UK.

9.6.4 *Annual Report*

IARI. 2008. Organic farming of rice based cropping systems with respect to nutrient management. *Annual Report 2008-09*. Indian Agricultural Research Institute, New Delhi. p. 48.

9.6.5 *Proceedings*

Schlestinger, W.H. 2009. On the fate of anthropogenic nitrogen. In: *Proceedings of the National Academy of Sciences, USA* **106**(1): 203–208.

9.6.6 *Abstracts*

Vairavan, K. 2009. Effect of pre and post emergence herbicide in pigeonpea. In: *Abstracts, International Conference on Grain Legumes: Quality Improvement, Value Addition and Trade*, 14– 16 February, 2009, Indian Society of Pulses Re-search Development, Indian Institute of Pulses Re-search Kanpur, India. p. 178.

9.6.7 *Extended Summaries*

Srinivasarao, Ch., Venkateswarlu, B., Vittal, K.P.R., Kundu, S. and Gangaiah, B. 2010. Car-bon stocks in different soil types in relation to rainfed production system and climate in tropical India. In: *Extended Summaries, National Symposium on Climate Change and Rainfed Agriculture*, 18–20 February, 2010, Indian Society of Dryland Agriculture, CRIDA. Hyderabad, India. pp. 272–274.

9.6.8 *Technical Report/Bulletins*

NNRMS. 2008. Space technology application for climate change. *Technical Report ISRO/ DOS/TR/ 01/2008*. 50 p.

9.6.9 *Online publications*

EPA. 2008. In: Carbon sequestration in Agriculture and Forestry. (www.epa.gov/sequestrations/index.html).

9.6.10 *Thesis*

Ram Swaroop Bana. 2009. Effect of preceding summer forage crops and phosphogypsum enriched urea on the productivity and quality of aromatic rice. *Ph. D. Thesis*, Division of Agronomy, Indian Agricultural Research institute, New Delhi, India. pp. 154 + v.

10. TABLES

- 10.1 Each table must be typed on a separate sheet (not to be included in the text) and numbered consecutively in the same order as they are mentioned in text.
- 10.2 The title should fully describe the contents of the table and explain any symbol or abbreviation used in it as a footnote, using asterisks or small letters, viz. a, b, etc.
- 10.3 Tables should be self-explanatory, not very large (< 10 columns in portrait and < 14 columns in landscape formats respectively) and may cover space up to 20-25% of the text.
- 10.4 Maximum size of table acceptable is what can be conveniently composed within one full printed page of the journal. The large sized tables should be suitably split into two or more small tables.
- 10.5 Standard abbreviations of units of different parameters should be indicated between parentheses.
- 10.6 The data in the tables should be corrected to minimum place of decimal, so as to make it more meaningful.
- 10.7 Vertical lines should not be used to separate columns. Similarly, horizontal lines should be used only where these are necessary, not in the body of the table.
- 10.8 All the tables should be placed after references.

11. FIGURES

- 11.1 Figures may be given in place of tables where a large number of values are presented that can be interpreted through figures. In no case, the same data should be presented in both tables and figures. Inclusion of CD values in figures will help making the figure more comprehensive.
- 11.2 Original figures should not be larger than twice the final size. They should be of good quality and printed clearly in black on plain white paper (not in colour). The figures may be sized to fit within the columns of the journal (8 cm width for single column or 17 cm for the full page).
- 11.3 Lines should be bold enough to allow the figure to be reduced to either single or double column width in the journal.
- 11.4 Vertical axes should be labelled vertically. Extremely small font and great variation in text sizes within figures should be avoided. The aim should be that on printing the words and figures, including caption, come to 9 pt type size.
- 11.5 Laser print outs of line diagrams are acceptable, while dot matrix printouts will be rejected. If required, the authors will be asked to submit soft

copy of diagrams of accepted articles for final print in Journal.

- 11.6 Illustrations can also be traced on white art card, using proper stencil. The numbers and letterings must be stenciled; free-hand drawing will not be accepted.
- 11.7 Colour photographs are accepted if these are necessary to improve the presentation and quality of the article.

12. SOME USEFUL HINTS

- 12.1 All scientific or technical names as well as all data and facts must be rechecked carefully before submitting the manuscript.
- 12.2 Dates and years may be mentioned as 28 May 2007, 28 May to 7 June, and 28-30 May instead of May 28, 2007, 28 May-7 June, and 28 to 30 May, respectively.
- 12.3 Avoid numerals and abbreviations at the beginning of a sentence; spell out or change the word order if necessary.
- 12.4 A comma may be used for data in thousands or more such as 10,000 or 2,30,000 etc. Alternatively, these data can also be presented as 10.0 or 230.0 if a common expression such as ' $\times 10^3$ ' is used in tables or figures. Avoid expressing data in 'lakhs', instead use 'thousand' or 'million'.
- 12.5 Only standard abbreviations should be used and these should invariably be explained at first mention. Avoid use of self made abbreviations such as Rhizo., Azo., buta, isop. etc. for *Rhizobium*, *Azotobacter*, butachlor, isoproturon, respectively.
- 12.6 For names of plant protection chemicals, the first letter of the name need not be capitalized for scientific names. Trade names should normally be avoided. All the names should be checked very carefully.
- 12.7 Use of unnecessary abbreviations and treatment symbols such as T_1 , T_2 etc. under Materials and Methods or tables without actually using these under Results and Discussion should be avoided.
- 12.8 All weights and measurements must be in SI or metric units. Use kg/ha, or t/ha (if more than 999 kg/ha), but not q/ha. Similarly, prefer use of g/ha, mg/kg, mg/l, mg/g, ml/l etc. rather than % or ppm. Do not follow the style kg ha^{-1} or t ha^{-1} .
- 12.9 Use % after numbers, not per cent, e.g. 7%. In a series or range of measurements, mention the units only at end, e.g. use 3, 10, 17 and 30°C; 20 or 30% more instead of 3°C, 10°C, 17°C and 30°C; 20% or 30% more.
- 12.10 Numeral should be used whenever it is followed

by a unit measure or its abbreviations e.g. 1 g, 3 m, 5 h, 6 months etc. Otherwise, words should be used for numbers one to nine, and numerals for larger ones except in a series of numbers when numerals should be used for all in the series.

- 12.11 For the composition of fertilizers, manures, crops or soil, the elemental forms (K, P, Mg etc.) should be used and not the oxides.
- 12.12 Application rates of fertilizer nutrients should not be mentioned in proportion such as: $N : P_2O_5 : K_2O$ 120 : 60 : 40 kg/ha. It can be given as 120 kg N + 26.4 kg P + 33.3 kg K/ha.
- 12.13 Variety may be mentioned within single quotes such as 'Pusa Basmati', 'Pusa Vishal' etc.
- 12.14 Statistical analysis of data in the standard experimental design should be sound and complete in itself with both $SEm \pm$ and $CD (P=0.05)$ values given for comparison of treatment means in tables and figures.
- 12.15 No change in authorship will be accepted once the article is submitted for consideration of its publication in the Journal.
- 12.16 Though authors can directly submit an article by mail or post, a forwarding letter from the controlling authority is necessary and the article will not be processed until the same is received.

13. Review Process

All the articles received for publication in *Indian Journal of Agronomy* are given an identification number. For finding out the allotted the article number, the authors may visit our web site (www.isa-india.in) a month after submission of the article. All the articles are initially screened by the Chief Editor solely or with the help of the Secretary and the members of the Editorial Board at the head quarters. If the article is found to be in order as per the 'Guidelines' and there is adequate original information, it is sent to an expert for peer re-view. On the contrary, the articles that are weak or are not conforming to 'Guidelines' are rejected as such or returned to the author for revision.

The authors may revise the article as per the comments by incorporation of additional data and information. The resubmitted article (within a month's time) will be reviewed for improvement in contents. If the Editorial Board is satisfied with the revision, it will be sent to reviewer. After the article has been examined by the reviewer, it will be suitably edited by a member of the Editorial Board. The comments of both the reviewer and the member of the Editorial Board along with the manuscript will be passed on to authors, who after attending to the suggestions will resubmit it. The thoroughly revised article will be checked by the Editorial Board and will be placed before Chief

Editor for a final decision. All the authors of accepted article must be a member of the Indian Society of Agronomy. If any author is not a member, the article will remain pending for want of membership. The article accepted for publication by the Chief Editor will be checked by a professional editor for English language, uniformity and any ambiguity before sending it to the press for composing. Proofs will be mailed to the corresponding author (as PDF file by e-mail, or as hard copy by post) for checking and will also be checked by the professional editor/member of Editorial Board. The Society does not levy any printing charges on the authors of articles published in the *Indian Journal of Agronomy*, and no reprints are supplied even when the author is willing to pay for the reprints.

CHECK LIST

Authors are requested to note the following points before submission of article:

1. Article should contain data not older than 5 years on the date of receipt in Society office.
2. All scientific or technical names as well as all data and facts must be rechecked carefully before submitting the manuscript.
3. Articles based on data of two or more seasons or years in cropping system mode, with proper statistical analysis, are encouraged. In such cases, seasonal or yearly variations should be clearly brought out through pooled analysis.
4. Articles on newly-emerging areas such as resource conserving techniques, agronomy of transgenic crops, organic farming, precision farming, integrated farming systems, sustainability issues and other unexplored areas will be given priority.
5. Routine studies on varietal evaluation, seed rate, spacing, sowing date etc. will not be considered unless these provide some new information. Similarly, articles based on simple growth or yield attributes without any data on soil or plant analysis will not be considered.
6. Economic analysis of data indicating total variable cost, net returns, benefit : cost ratio etc. should be given, wherever required.
7. In weed control experiments, information on specific weed flora, dry matter, nutrient uptake by weeds and crop, WCE, WI etc. should be included.
8. In nutrient management experiments, data on nutrient uptake, efficiency, residual soil fertility, nutrient balance etc. are necessary.
9. In dryland and irrigation studies, information on rainfall pattern, soil moisture status, consumptive use of water, root growth, WUE or water productivity etc. should be included.

10. In studies on intercropping systems, suitable indices like CEY, LER, RCC, aggressivity, competition index etc. will add value to the information. Similarly, in cropping systems research, suitable indices should be given.
11. Discussion becomes very weak when statements like “The results are in agreement with”, ‘Similar results were reported by’ are used. These should be avoided because they give the impression that nothing new was achieved in the reported study.
12. Articles should be typed on one side of white A4 size paper, double-spaced throughout including abstract, references and tables, leaving adequate margins on all sides to allow reviewer’s or editor’s remarks. All the pages should be numbered consecutively.
13. Authors are not required to send floppy or CD on first submission of the article. Only the revised version of accepted article may be sent on floppy, CD or through Email.
14. Authors are encouraged to send their articles through Email to save time and postage.
15. All the contributing authors must be the members of Indian Society of Agronomy.
16. To ensure the consideration of the submitted article, the authors are requested to present the information in a systematic and scientific manner, seeking help from their senior and experienced colleagues if necessary, because casually written manuscripts would be outright rejected.
17. In exceptional cases where the authors feel that the comments made by the reviewer or the editor for recommending rejection of the article are not justified, they may send their counter arguments with full justification. The Editorial Board will again seek the opinions of the expert as well as of another reviewer in such cases.
18. Authors are expected to maintain high standards of integrity and ethics while submitting their articles. They should not hide any information or provide wrong information, and must not duplicate the information already published or submitted for publication elsewhere. It is also desirable that the fruits of research are shared suitably with other co-authors. Undue credit should not be given to any one who has not made a notable contribution, nor should the name of any author excluded who has made significant contributions to the reported work.
19. Type as per IJA format (New Times Roman, Font 12, Double spaced)
20. Page numbering including tables and figures.
21. All data pooled over 2-3 years of experimentation and provide pooled data in table and text. Annual data only for dry land experiment over three years or experiment with cumulative effect.
22. Research Communication based on M.Sc. work will be considered. These may be restricted to typed 4 pages including table and figures (not more than 2 tables).
23. Yield data in tonnes/ha (no q/ha or kg/ha).
24. Data restricted to 3 significant digits (153, 15.3, 1.53 etc.). For gross and net returns use $\times 10^3$ ₹/ha in the column heading and data given in thousand.
25. SEM $\pm$ and CD in (P=0.05) given for each table.
26. References—Cross check the text and bibliography. Check year of publication carefully.
27. Scientific name of each crop with authority in the abstract.
28. Email ID of corresponding author and designation with affiliation of each author as footnote.

Research articles providing comprehensive information based on recent experimentation and following all the instructions as per the ‘Revised Guidelines for Contributors’ will be immediately processed for publication in Journal.

All correspondence should be addressed to the Secretary, Indian Society of Agronomy, Division of Agronomy, Indian Agricultural Research Institute, Pusa, New Delhi 110 012, India. [Telephone/Telefax: 0091-11-25842283; Email: secretary_isa@hotmail.com]

