

Influence of corn residue management under various tillage systems on physiochemical properties of soil in western Pakistan

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INTRODUCTION

Continuous cereal based crop rotation; inappropriate cultivation, burning and removing crop residues deteriorate soil physiochemical characteristics in western plain of Pakistan. The objective of this study was to evaluate the effects of different tillage systems and crop residues management with and without nitrogen on soil physiochemical properties that may ultimately effect subsequent crop productivity.

MATERIAL AND METHODS

- Spring wheat was tested during 2009-11 under irrigated conditions in a continuous crop rotation of corn-wheat on silt clay loam soil of Cereal Crops Research Institute Pirsabak, Nowshera, Pakistan.
- Main Factor: Three tillage systems, 1) reduced (rotavator=10 cm), 2) conventional (cultivator=20 cm) and 3) deep (moldboard =30 cm)
- Sub Factor: Six corn stubble management practices (RM) 1) physical removal, 2) burn and 3) incorporation alone, 4) physical removal + 120 kg N ha⁻¹, 5) burn + 120 kg N ha⁻¹ and 6) incorporation + 120 kg N ha⁻¹
- A total of 18 treatments were tested in a RCB design with a split plot treatment arrangement having 4 replications in each year.

RESULTS

- Significantly higher SMC (20.52 %), SMN (14.70 mg kg⁻¹ soil), STN (0.81 g kg⁻¹ soil), SOC (14.91 g kg⁻¹ soil) and C/N (21.19) were observed in the residue incorporated (RI) plots mix with fertilizer N (Figs. 1, 3, 4, 5 & 6) while the same treatment significantly reduced SBD (1.196 g cm⁻³) and soil pH (7.38) (Figs. 2 & 7) as compared to other residue managed plots either in sole or mix with fertilizer N.
- Statistically significant differences for SMC, SMN, STN, SOC and soil pH were observed during May 2011 as compared to Sept. 2009 (base line) .
- Reduce tillage system had significantly effected SMC, SBD, SMN, STN and SOC as compared to conventional and deep tillage system.

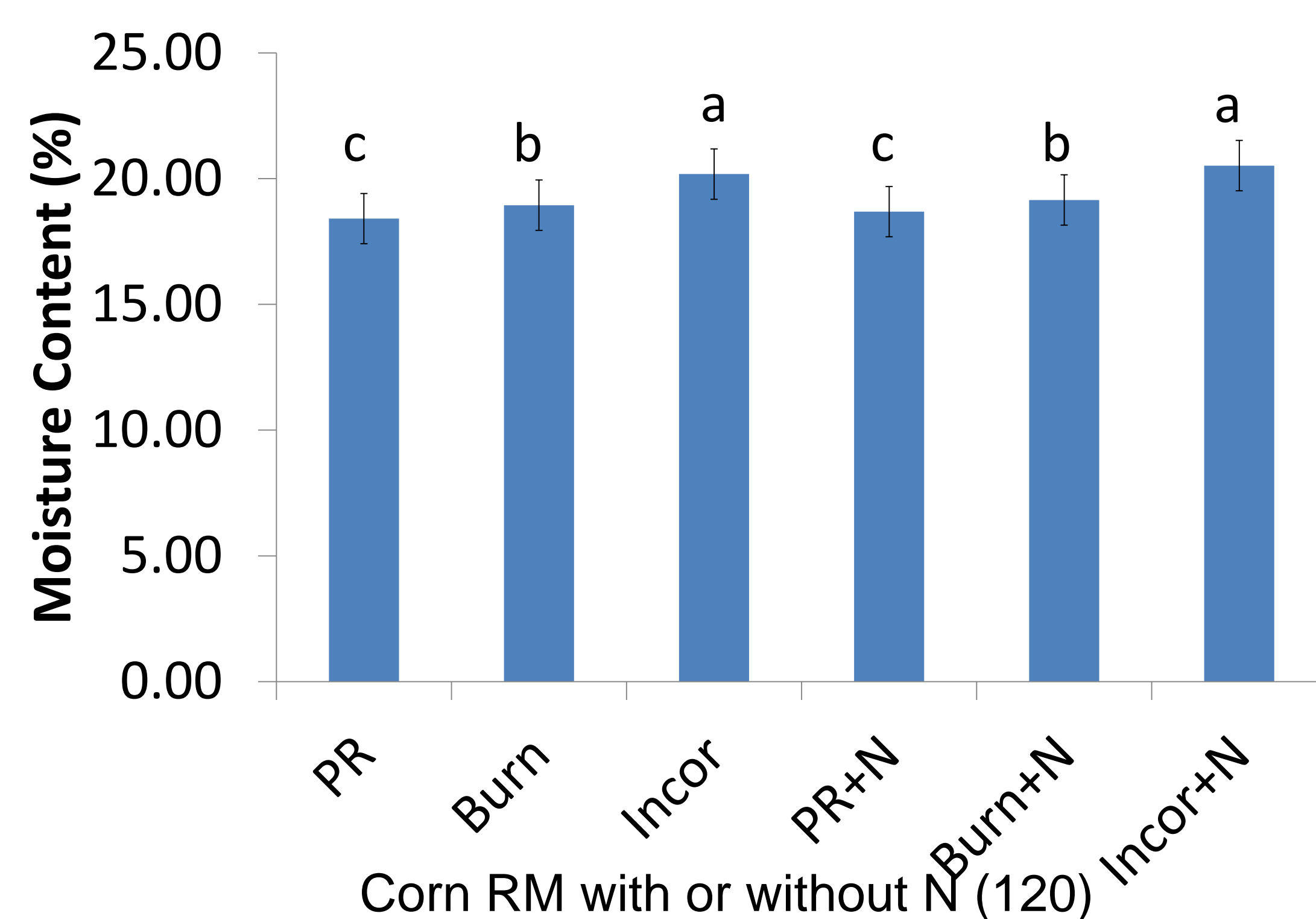
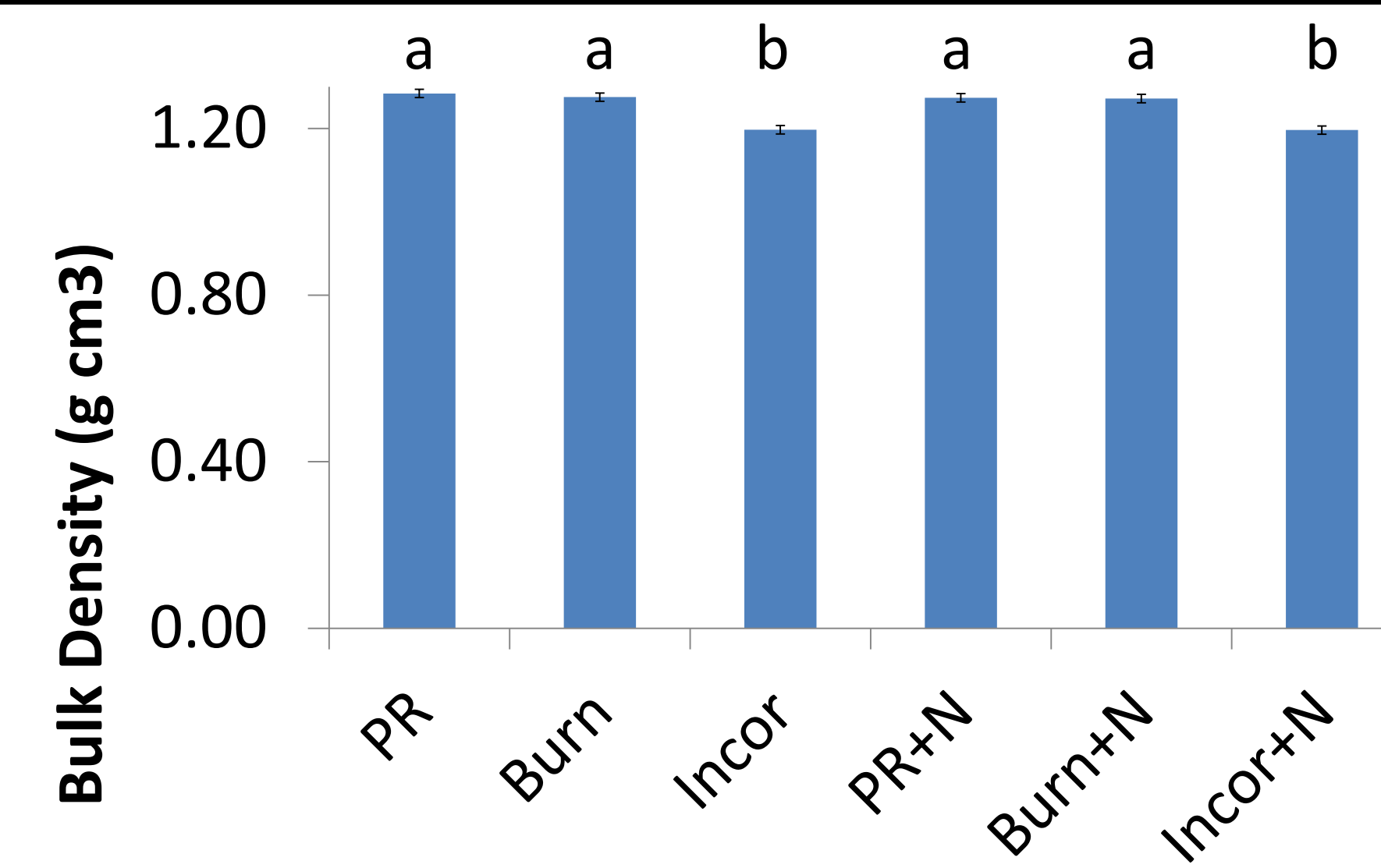
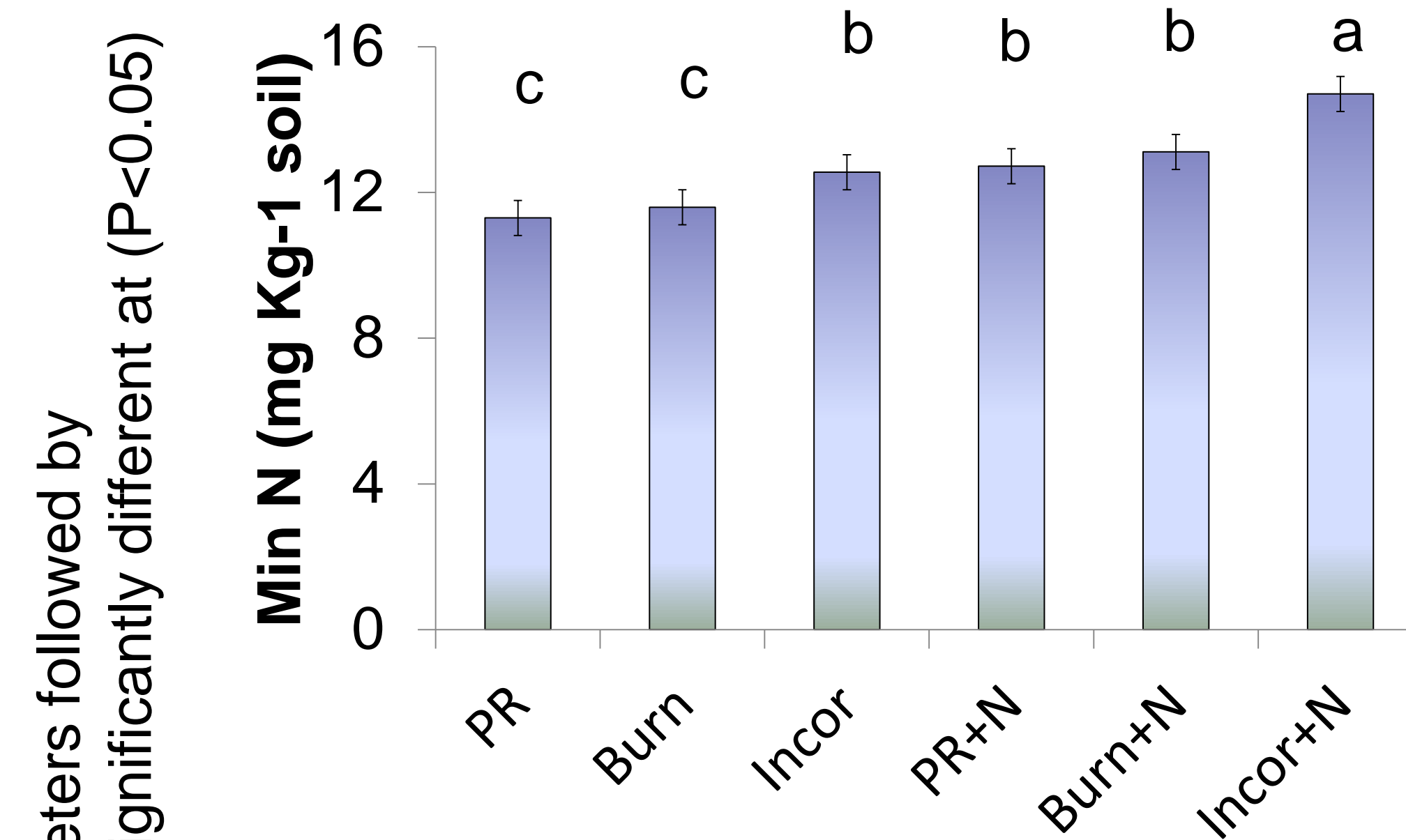


Fig.1. Different corn stubble management practices effects on SMC



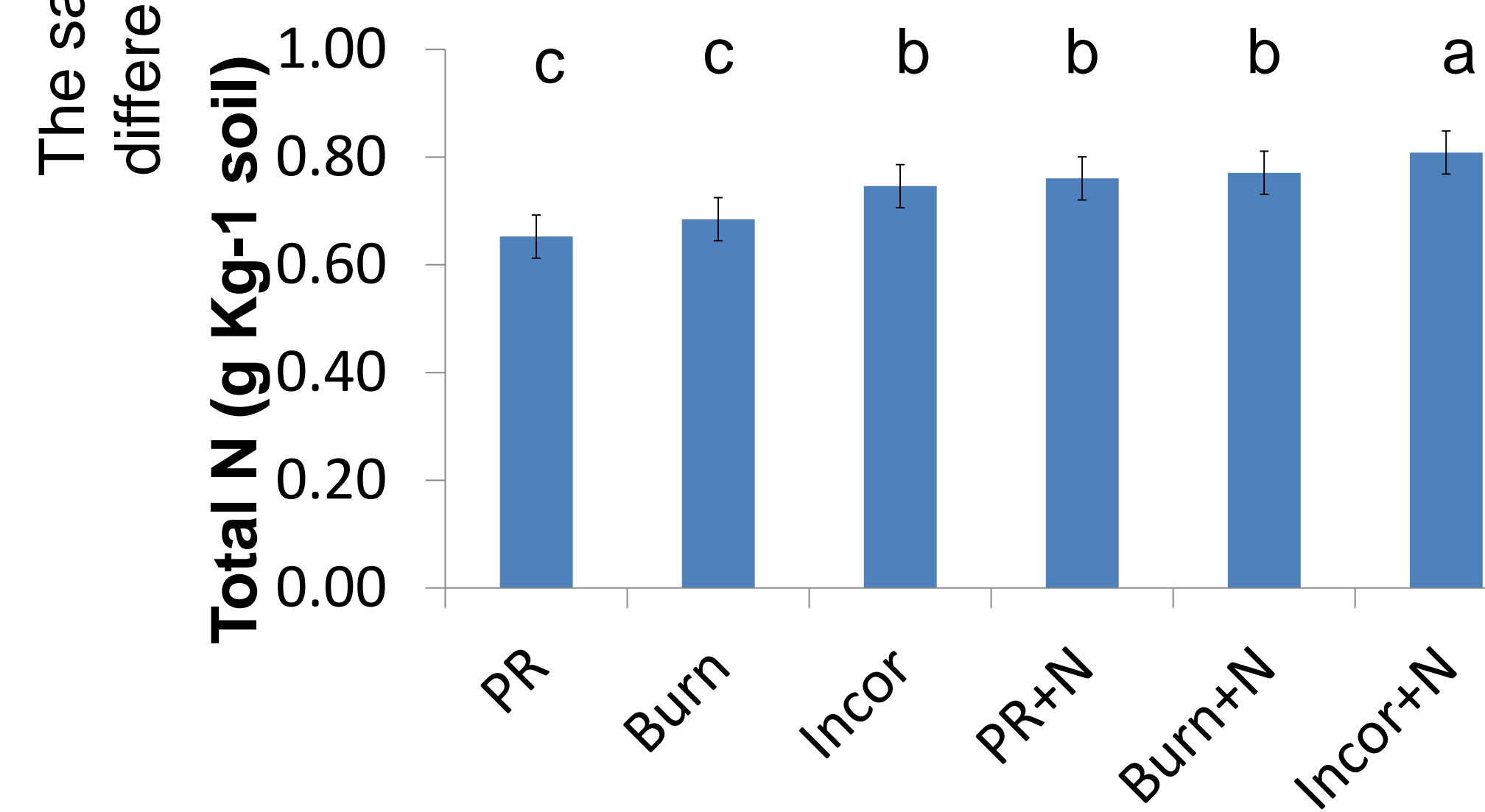
Corn RM with or without N (120)

Fig.2. Different corn stubble management practices effects on SBD



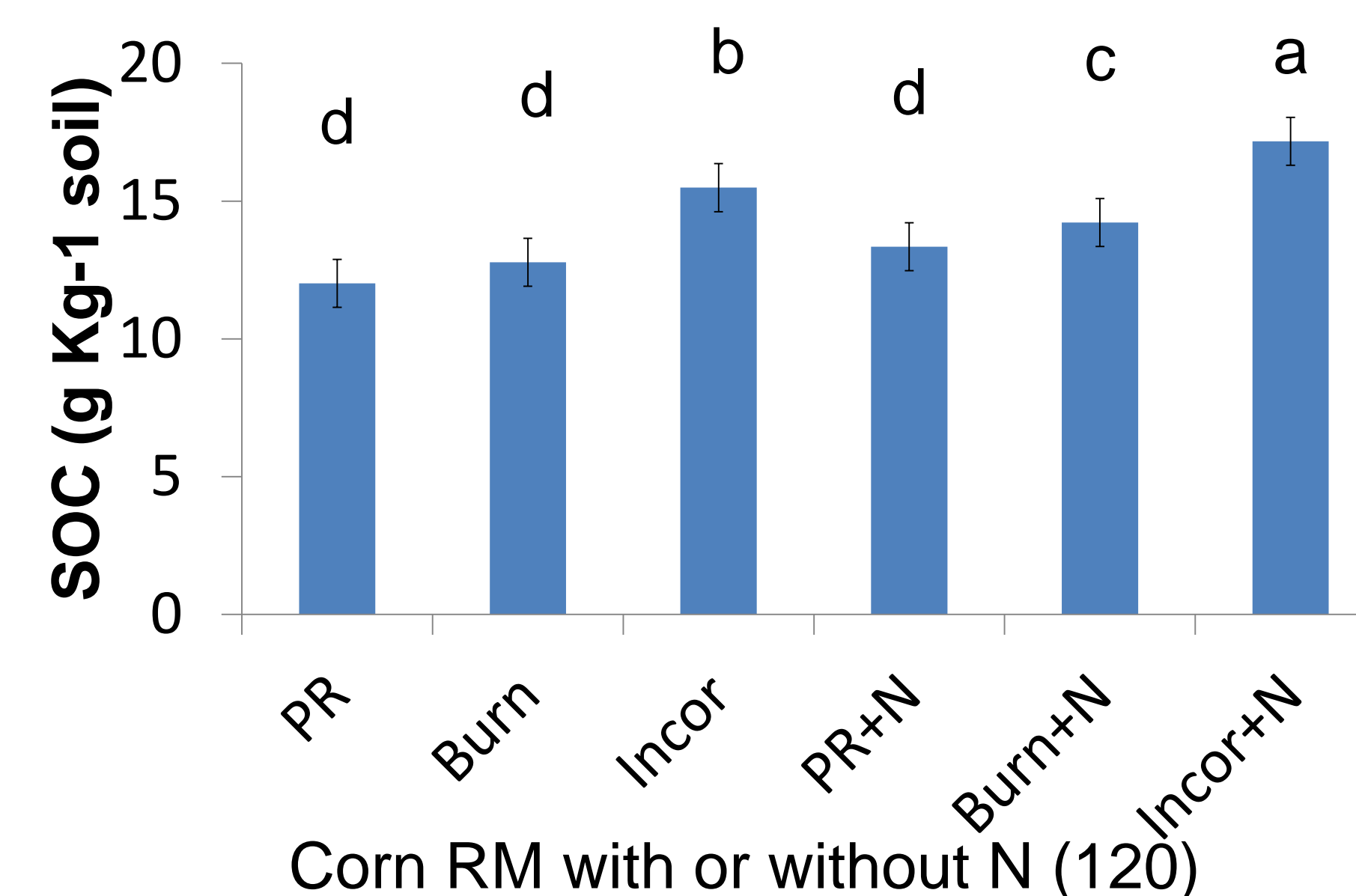
Corn RM with or without N (120)

Fig.3. Different corn stubble management practices effects on SMN



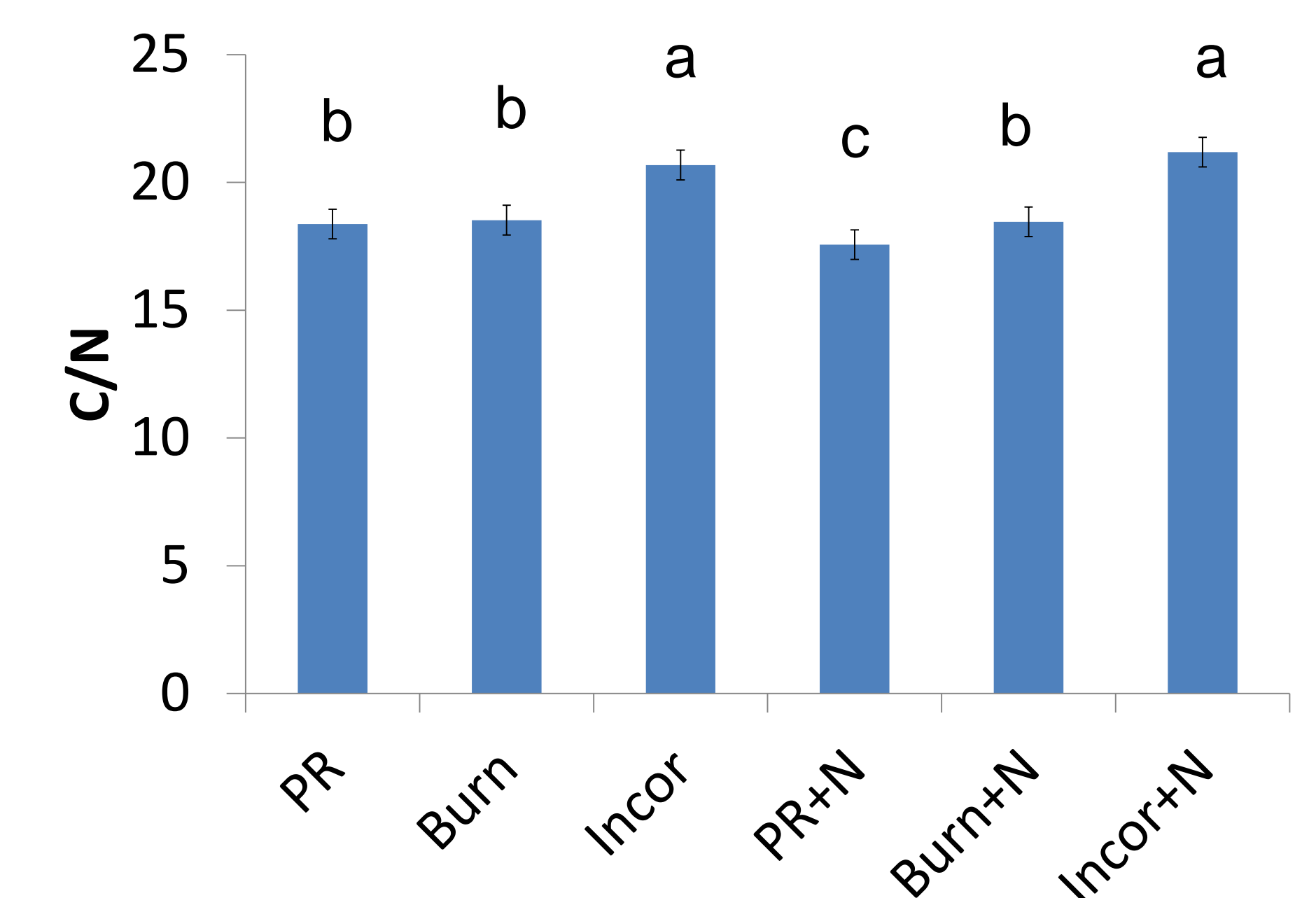
Corn RM with or without N (120)

Fig.4. Different corn stubble management practices effects on STN



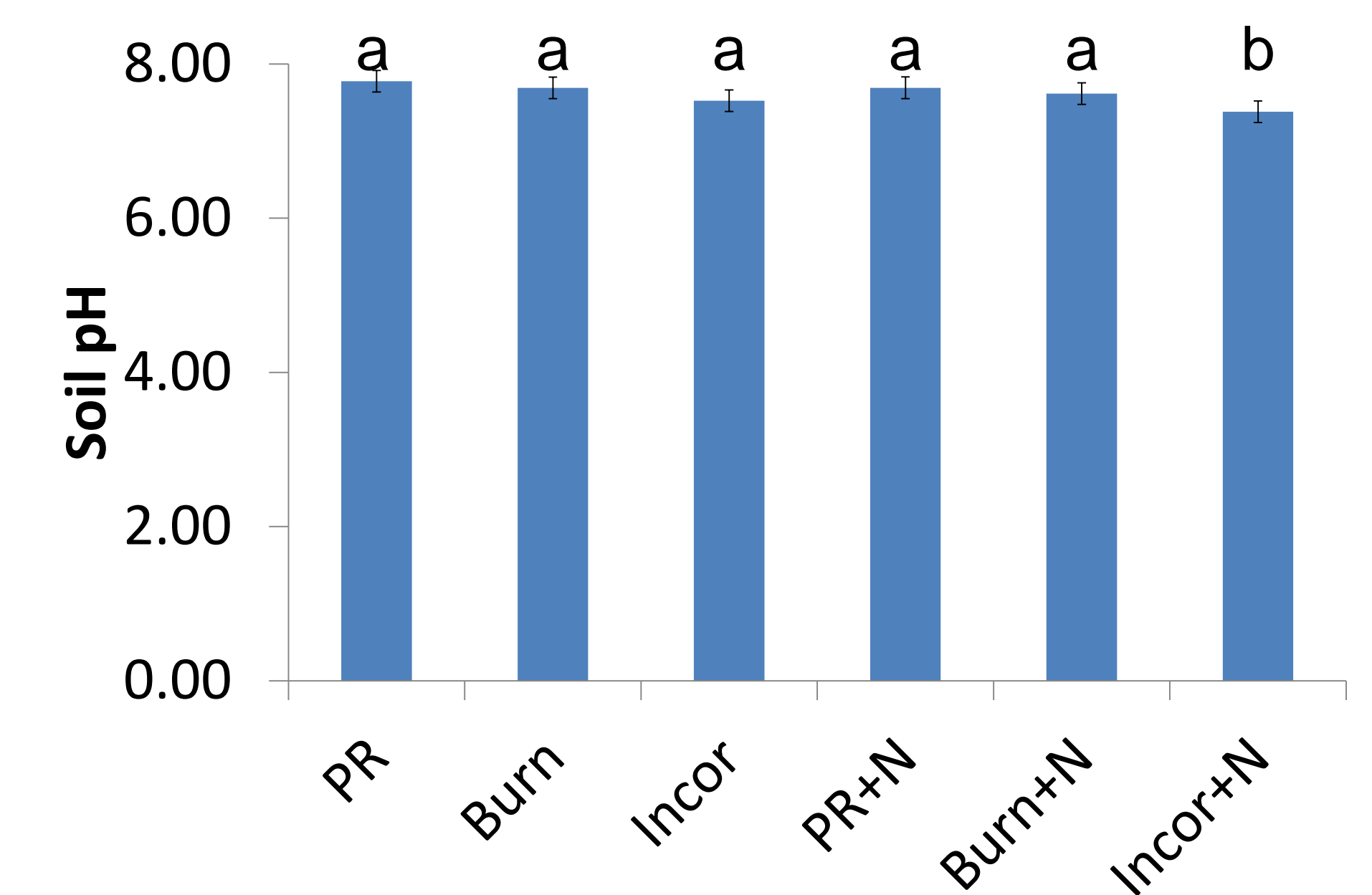
Corn RM with or without N (120)

Fig.5. Different corn stubble management practices effects on SOC



Corn RM with or without N (120)

Fig. 6. Different corn stubble management practices effects on C/N



Corn RM with or without N (120)

Fig. 7. Different corn stubble management practices effects on soil pH

CONCLUSION

Short term residue incorporation mix with fertilizer N had significantly improved soil physiochemical properties as compared to residue removal and burning alone or mix with fertilizer nitrogen. This improvement in soil physiochemical characteristic is further supported by reduced tillage which subsequently enhanced crop productivity .

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