

## IMPACT: PLANT NUTRIENT UPTAKE

### Reference 18

Li Z, Song Z, Singh BP, Wang H 2019 The impact of crop residue biochars on silicon and nutrient cycles in croplands. *Sci Total Environ* 659:673–80  
10.1016/j.scitotenv.2018.12.381

### Background and objective

NA NA

### Search strategy and selection criteria

The keywords “straw biochar” AND “silicon” OR “nitrogen”, “phosphorus”, and “nutrient” were entered into the Web of Science database to identify relevant studies for data extraction. Biochars derived from rice husk, corn stover, sugarcane residue, and corn cobs were also searched for data extraction. Authors checked tables and figures in the text to determine if a related paper contained original data and provided relevant Si and nutrient contents and their uptake in crops. The biochars from which we collected data were primarily produced by thermal pyrolysis of biomass materials (crop residue feedstocks) under oxygen-limited conditions with pyrolysis temperatures ranging from 150 °C to 900 °C.

### Data and analysis

Regression and correlation analyses were conducted using SPSS software (IBM, version 23.0), with a significance defined at <0.05. Graphs were drawn using Excel 2016 (Microsoft office 2016, Microsoft, USA).

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
171	Not specified (for N and P), Rice (for Silicon)	Soil amendment with biochar	No amendment	Metric: Plant nutrients uptake (Si, P, N); Effect size: Standardized difference of the considered metrics between intervention and control	0.625

### Results

- The amount of Si input via the addition of biochars to paddy soils positively correlated with the increment of Si concentration in biochars-mediated rice straw.
- Crop N uptake demonstrated a robust increase when a high amount of N was added to cropland through addition of biochars.
- The increment of crop P uptake in response to addition of biochars had significant correlation with the amount of P input through biochar application.

### Factors influencing effect sizes

- No factors influencing effect sizes to report

### Conclusion

Higher amount of silicon and nutrients input through addition of biochars significantly improved crop silicon and nutrients (N,P) uptake.