

# Rice Straw Removal Costs

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In addition to the cost of baling rice straw (i.e. to bale and stack) there are also costs associated with nutrient losses that occur with straw removal as compared to incorporation. Burning rice straw volatilizes most of the nitrogen and sulfur causing most to be lost into the atmosphere, whereas most of the potassium remains in the ash. Straw removal takes away potassium and nitrogen as well as sulfur. Conversely the majority of nutrients are retained in the field when the straw is incorporated. The nutrient impacts from different straw management processes need to be considered as part of the costs.

Typical rice straw nutrient content based on 100% dry matter basis as reported by Summers (2001) are:

- .07% nitrogen
- 1.7% potassium

Research by Nader and Robinson. (2004) on rice straw samples from 77 different stacks over two years reported similar N and K levels in rice straw, in addition to the nutrient concentrations for several other nutrients (Table 1).

Table 1. Concentration (%) of selected nutrients in rice straw collected at several locations.

	Nitrogen	Potassium	Calcium	Phosphorus	Magnesium	Sulfur	Sodium	Chloride
Average	0.77	1.74	0.30	0.10	0.20	0.08	0.15	0.52
Maximum	1.12	2.70	0.50	0.17	0.30	0.15	0.50	1.20
Minimum	0.53	1.10	0.19	0.05	0.12	0.04	0.01	0.10

Rice growers report that baling harvester windrows cut at the waterline yield an average of 1.5 tons of straw per acre. Most straw is baled at 6-12% moisture levels. Table 2 represents the average nutrient loss at different straw removal rates as compared to incorporation. The example assumes the straw is baled at 6% moisture and that 100% of the nitrogen and potassium are recycled by incorporation.

Table 2. Average nutrient loss at different straw removal rates.

<b><u>Tons straw removed/acre</u></b>	<b>1</b>	<b>1.5</b>	<b>2</b>	<b>3</b>
Nitrogen (lbs) removed/acre	14.5	21.7	29	43.4
Potassium (lbs) removed/acre	32.7	49.1	65.4	98.1
Phosphorus (lbs) removed/acre	1.9	2.8	3.8	5.6

## Nutrient Loss with Straw Removal

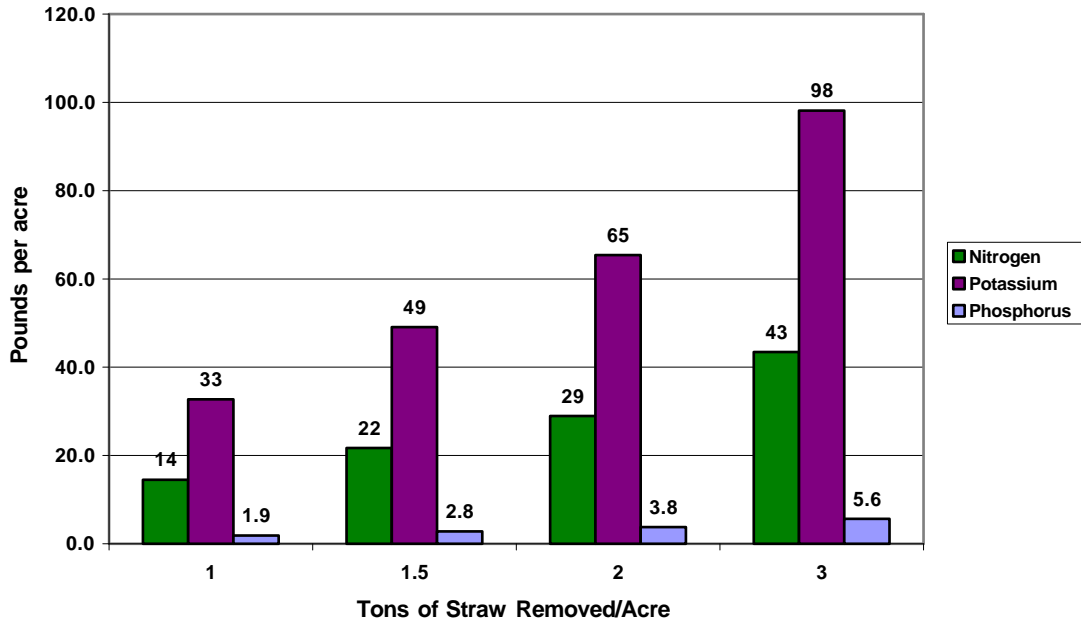


Figure 1. Average nutrient loss at different straw removal rates.

### References

1. Nader, G.A., and P.H. Robinson. 2003. Rice Research Board Annual Report. Pages 171-190.
2. Nader, G.A., and P.H. Robinson. 2004. Rice Research Board Annual Report. [http://www.carrb.com/04rpt/2004NaderRU\\_-5.pdf](http://www.carrb.com/04rpt/2004NaderRU_-5.pdf)
3. Summer, MD et al. 2001. Developing engineering data on rice straw for improvement of harvesting, handling, and utilization. Proceedings Rice Straw Management Update. UCCE, Yuba City, CA. March 2001.