

Fire risks associated with combine harvesters: analysis of machinery critical points

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SUPPORTING INFORMATION

Table S1. Proximate analysis (*top*) and elemental analysis (*bottom*) results for the wheat residues.

| Density (kg·m ³) | Moisture (%) | Ashes (%) | Volatile matters (%) | Fixed C (%) |
|------------------------------|--------------|-----------|----------------------|-------------|
| 1233 | 16 | 4 | 59 | 21 |
| C (%) | H (%) | O (%) | N (%) | |
| 48.5 | 5.5 | 45.8 | 0.3 | |

Table S2. Granulometric analysis results for the wheat residues from five combine harvesters used in the hot plate auto-ignition studies.

| Machine | Straw chopper | Region | Total sample weight (g) | >4 mm | 2 mm | 1 mm | 500 µm | 250 µm | <250 µm |
|------------|---------------|------------------------|-------------------------|--------|--------|--------|--------|--------|---------|
| | | | | | | | | | |
| Machine #1 | Yes | Cutting bar | 275.08 | 25.83% | 10.88% | 28.10% | 14.05% | 9.50% | 11.64% |
| | | Front right wheel axle | 123.18 | 9.30% | 16.51% | 25.86% | 23.79% | 14.79% | 9.76% |
| Machine #2 | Yes | Cutting bar | 187.06 | 73.79% | 13.54% | 4.19% | 3.21% | 2.58% | 2.69% |
| | | Front right wheel axle | 279.55 | 2.54% | 28.74% | 30.56% | 14.53% | 10.80% | 12.83% |
| Machine #3 | Yes | Straw chopper | 149.12 | 4.23% | 8.32% | 18.10% | 18.68% | 19.50% | 31.16% |
| | | Straw chopper | 166.95 | 9.57% | 12.17% | 16.52% | 18.03% | 13.27% | 30.45% |
| Machine #4 | No | Back right wheel axle | 48.08 | 8.03% | 32.01% | 20.63% | 19.51% | 11.67% | 8.15% |
| | | Entrance to thresher | 387.03 | 5.00% | 33.08% | 12.09% | 10.21% | 9.83% | 29.79% |
| Machine #5 | No | Front right wheel axle | 518.31 | 1.10% | 24.47% | 29.61% | 12.39% | 8.85% | 23.59% |
| | | Straw chopper | 285.69 | 20.84% | 20.35% | 15.41% | 13.45% | 9.97% | 19.99% |

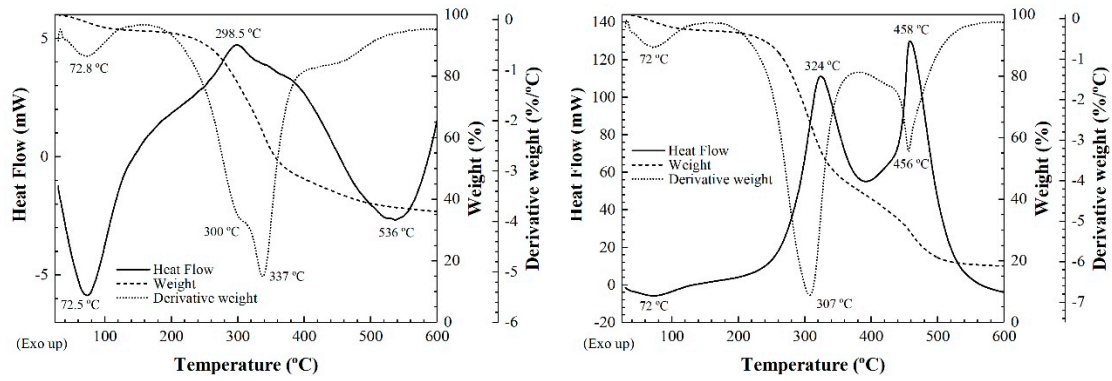


Figure S1. DSC (dotted line, y-axis on the left side of the graph), TG (solid line, first y-axis on the right side of the graph) and DTG (dashed line, second (rightmost) y-axis on the right side of the graph) curves for wheat residues in: (left) inert and (right) oxidative conditions.

Table S3. Tests of between-subjects effects (results from univariate analysis) for temperatures as a function of the exhaust gases treatment system.

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|--------------------------------|---------------------------|------|---------------|-----------|------|
| Corrected Model | 13009104.340 ^a | 4 | 3252276.085 | 1550.147 | .000 |
| Intercept | 136005195.458 | 1 | 136005195.458 | 64824.760 | .000 |
| Exhaust gases treatment system | 13009104.340 | 4 | 3252276.085 | 1550.147 | .000 |
| Error | 20021633.519 | 9543 | 2098.044 | | |
| Total | 232154209.530 | 9548 | | | |
| Corrected Total | 33030737.859 | 9547 | | | |

a. R Squared = .394 (Adjusted R Squared = .394)

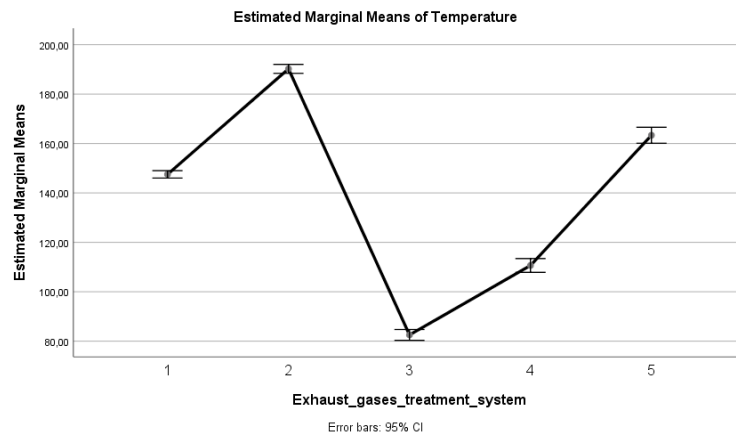


Figure S2. Results from univariate analysis for temperatures as a function of the exhaust gases treatment system.