**Appendix S1.** Supplementary methods describing the (A) analysis of plant DNA present in rhino dung samples and (B) the implementation of the fire mapping algorithm for Serengeti National Park from raw MODIS reflectance data and (C) the validation results for the fire map.

***(A) Analysis of plant DNA from rhino dung* –** Total DNA was extracted from ~10 mg of fecal sample in a total volume of 200 μL using the DNeasy Mini Stool Kit (Qiagen GmbH). Mock extractions without samples were systematically performed to monitor possible contaminations. DNA amplifications, repeated twice per sample, were carried out using the universal gh primers in the chloroplast *trn* L intron (see Table 1 in Taberlet et al., 2007). After amplification, samples were purified using the MinElute PCR purification kit (Qiagen GmbH) and pooled for the pyrosequencing run (Illumina Hiseq). Each sample was recognized by a specific six base tag for assigning sequences to samples during bioinformatic processing.

***(B) Implementation of the fire mapping algorithm* –** The standard MODIS fire product (MCD45A) is produced at a 500 m resolution and trained/validated at a global scale. Because Rhino forage may be associated with variation in fire frequency at a smaller grain size, we used an algorithm developed by Dempewolf et al. (2007) that uses raw MODIS reflectance to produce a 250 m fire classification trained specifically for the Serengeti ecosystem. This fire detection algorithm uses the red (0.648 µm) and NIR (0.858 µm) reflectance bands from the MODIS Terra satellite to calculate a Burned Area Index (BAI) that accentuates the reflectance properties of charcoal versus vegetation. A regression equation is applied to automate the selection of a dynamic BAI threshold value for each image in a time series to determine fire boundaries based on the seasonal state of the vegetation as well as atmospheric conditions.

We reproduced the burn classification algorithm as described in Dempewolf et al. (2007) using the R statistical coding environment (R Development Core Team, 2017), and made several minor changes to the original implementation. The original algorithm described in Dempewolf et al. (2007) was intended to be automated over 250 m daily MODIS/Terra Surface (MOD09GQK) reflectance data. We used the newer reflectance product, MOD09GQ, which includes more recent dates, and we processed the QA/QC flags in the same way as Dempewolf et al. (2007). The original product predicted burns from 2000 – 2005, and here we have extended the coverage to encompass 2000 – 2016. Finally, the original algorithm operated over 10 day composites, but we applied the same compositing rules from Dempewolf et al. (2007) to 8 day composites in order to better align with other MODIS products. Because of these adjustments to the original implementation, we provide an independent validation of the resulting fire classification, although we did not expect any significant differences based on these changes.

As in Dempewolf et al. (2007), we produced yearly burn layers, with each year beginning on May 1st and ending on April 30th of the following year, in order to better capture the fire season. The full 16 year fire frequency map is shown in Figure S1, and Figure S2 show panels with the individual yearly burns. These data are available at https://datadryad.org/stash/dataset/doi:10.5061/dryad.5q39d8q.

***(C) Validation of fire frequency map* –** The fire detection algorithm describe here was previously validated by Dempewolf et al. (2007) using field observations of fires and using satellite based fire data for the years 2000-2005. The algorithm performed very well in validation, having both user’s and producer’s accuracy between 74 and 99.6% depending upon the validation data source. Overall, the original validation revealed that the fire algorithm was slightly underestimating fire extent. Because we extended this algorithm into dates beyond the original validation, and because the MODIS reflectance product has changed since Dempewolf et al. (2007), we conducted a second validation spanning the full, updated dataset (2000 – 2016). Validation data were collected by searching Google Earth historical imagery and the Landsat Look Viewer (landsatlook.usgs.gov) for apparent burns. Unburned areas were also recorded, and some of these points were selected on multiple years where the satellite imagery showed it also had not burned. These data were used to calculate an error matrix (Table S1,S2) (n = 222, mean of 16 per year). The algorithm performed well across the new burn years, and had both high user’s and producer’s accuracy, both being within the original range of accuracies for the fire classification. The Kappa coefficient for the burn classification was 0.91 (p < 0.0001) indicating that the algorithm remained a strong classifier of burns across the entire newly produced dataset, as compared to a random classification (vcd R package) (Meyer et al., 2016).

**References**

Dempewolf, J., Trigg, S., DeFries, R.S., Eby, S., 2007. Burned-Area Mapping of the Serengeti-Mara Region Using MODIS Reflectance Data. IEEE Geosci. Remote Sens. Lett. 4, 312–316. doi:10.1109/LGRS.2007.894140

Meyer, D., Zeileis, A., Hornik, K., 2016. vcd: Visualizing Categorical Data.

R Development Core Team, 2017. R: A Language and Environment for Statistical Computing. R Development Core Team.

Taberlet, P., Coissac, E., Pompanon, F., Gielly, L., Miquel, C., Valentini, A., Vermat, T., Corthier, G., Brochmann, C., & Willerslev, E. (2007). Power and limitations of the chloroplast trnL (UAA) intron for plant DNA barcoding. Nucleic acids research, 35(3), e14-e14

**Figure S1.** Fire frequency (number of fires) for the years 2000 – 2016, calculated by summing the yearly burn data produced by our update to the fire algorithm of Dempewolf et al. (2007).

**D:\Dropbox\RESEARCH\MANUSCRIPTS\IN_PREP\RHINO_MANU\fire_val\FF final.tif**

**D:\Dropbox\RESEARCH\MANUSCRIPTS\IN_PREP\RHINO_MANU\fire_val\annual burns final.tifFigure S2.** Annual burn data extended to 2016 using the Dempewolf et al. (2007) algorithm.

.

**Table S1.** Contingency table showing user, producer and overall accuracy. B = burned, UB = unburned, UA = user’s accuracy, PA = producer’s accuracy, italic text = overall accuracy. Dempewolf refers to original mapping algorithm reported in: Dempewolf, J., Trigg, S., DeFries, R.S. and Eby, S., 2007. Burned-area mapping of the Serengeti–Mara region using MODIS reflectance data. IEEE Geoscience and Remote Sensing Letters, 4(2), pp.312-316.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **B**  **Validation** | **UB**  **Validation** | **UA %** |
| **B Dempewolf** | 56 | 5 | 91.8 |
| **UB Dempewolf** | 3 | 158 | 98.1 |
| **PA%** | 94.9 | 96.9 | *96.4* |

**Table S2.** Validation data collected from Google Earth and Landsat Look Viewer for the purpose to quantify the accuracy of the fire map. The latitude (Lat) and longitude (Long) of mapped sites is given in the datum WGS1984 and were either burned (Burn = 1) or unburned (Burn = 0).

|  |  |  |  |
| --- | --- | --- | --- |
| **Lat** | **Long** | **Burn** | **Date** |
| -2.33721 | 34.76092 | 1 | 9/1/2002 |
| -2.32709 | 34.76747 | 1 | 9/1/2002 |
| -2.31041 | 34.741 | 1 | 9/1/2002 |
| -2.27484 | 34.78681 | 1 | 9/1/2002 |
| -2.2862 | 34.79128 | 1 | 9/1/2002 |
| -2.60577 | 34.73261 | 1 | 9/1/2002 |
| -2.20383 | 34.04797 | 1 | 3/15/2003 |
| -2.1999 | 34.05241 | 1 | 3/15/2003 |
| -2.18536 | 34.02844 | 1 | 3/15/2003 |
| -2.21981 | 34.07728 | 1 | 3/15/2003 |
| -2.13568 | 34.02217 | 1 | 3/15/2003 |
| -2.06991 | 33.99802 | 1 | 7/19/2009 |
| -2.07999 | 34.01274 | 1 | 7/19/2009 |
| -2.14124 | 34.82123 | 1 | 10/4/2009 |
| -3.09157 | 34.45878 | 1 | 10/12/2009 |
| -3.04114 | 34.45991 | 1 | 10/12/2009 |
| -2.11673 | 33.99331 | 1 | 6/16/2010 |
| -2.10834 | 34.00615 | 1 | 6/16/2010 |
| -2.11458 | 33.97631 | 1 | 6/16/2010 |
| -2.23762 | 34.5929 | 1 | 8/22/2011 |
| -2.18547 | 34.04886 | 1 | 8/25/2013 |
| -2.18507 | 34.02426 | 1 | 8/25/2013 |
| -2.23251 | 34.04245 | 1 | 8/25/2013 |
| -2.18635 | 34.04918 | 1 | 8/25/2013 |
| -2.12081 | 34.05562 | 1 | 8/25/2013 |
| -2.09143 | 34.01508 | 1 | 8/25/2013 |
| -2.2072 | 34.24228 | 1 | 8/25/2013 |
| -2.26938 | 34.28645 | 1 | 8/25/2013 |
| -2.27539 | 34.30863 | 1 | 8/25/2013 |
| -2.37312 | 34.2607 | 1 | 8/25/2013 |
| -2.06957 | 34.97767 | 1 | 9/14/2013 |
| -2.06217 | 34.95282 | 1 | 9/14/2013 |
| -2.0234 | 34.93963 | 1 | 9/14/2013 |
| -2.45035 | 34.63416 | 1 | 9/14/2013 |
| -1.58538 | 34.67759 | 1 | 10/29/2013 |
| -1.59129 | 34.68376 | 1 | 10/29/2013 |
| -1.547 | 34.705 | 1 | 2/26/2014 |
| -1.57 | 34.69 | 1 | 2/26/2014 |
| -1.598 | 34.708 | 1 | 2/26/2014 |
| -1.614 | 34.697 | 1 | 2/26/2014 |
| -2.334 | 34.663 | 1 | 5/17/2014 |
| -2.314 | 34.729 | 1 | 5/17/2014 |
| -2.391 | 34.751 | 1 | 5/17/2014 |
| -2.227 | 34.718 | 1 | 5/17/2014 |
| -2.174 | 34.795 | 1 | 5/17/2014 |
| -2.306 | 34.875 | 1 | 5/17/2014 |
| -2.172 | 35.136 | 1 | 5/17/2014 |
| -2.188 | 35.108 | 1 | 5/17/2014 |
| -1.96 | 35.053 | 1 | 5/17/2014 |
| -1.667 | 35.171 | 1 | 5/17/2014 |
| -2.773 | 34.485 | 1 | 5/24/2014 |
| -2.745 | 34.531 | 1 | 5/24/2014 |
| -2.534 | 34.432 | 1 | 5/24/2014 |
| -2.9 | 34.498 | 1 | 5/24/2014 |
| -2.589 | 34.399 | 1 | 3/16/2015 |
| -2.232 | 34.106 | 1 | 3/16/2015 |
| -2.089 | 34.441 | 1 | 3/16/2015 |
| -2.177 | 34.303 | 1 | 3/16/2015 |
| -2.723 | 34.432 | 1 | 3/16/2015 |
| -2.578 | 34.465 | 1 | 3/16/2015 |
| -2.29 | 34.193 | 1 | 3/16/2015 |
| -2.82101 | 35.12096 | 0 | 12/30/2001 |
| -2.68503 | 35.18645 | 0 | 12/30/2001 |
| -2.97884 | 35.06654 | 0 | 12/30/2001 |
| -2.98597 | 35.04215 | 0 | 10/20/2002 |
| -2.94329 | 35.01154 | 0 | 10/20/2002 |
| -3.02324 | 34.92846 | 0 | 10/20/2002 |
| -2.60476 | 35.03505 | 0 | 10/20/2002 |
| -2.57287 | 35.04542 | 0 | 10/20/2002 |
| -2.90742 | 35.06046 | 0 | 1/18/2003 |
| -2.80463 | 35.16127 | 0 | 1/26/2004 |
| -2.86163 | 35.16541 | 0 | 1/26/2004 |
| -2.91323 | 35.1074 | 0 | 1/26/2004 |
| -2.90412 | 35.15455 | 0 | 12/30/2006 |
| -2.97121 | 35.06953 | 0 | 12/30/2006 |
| -2.82101 | 35.12096 | 0 | 12/20/2007 |
| -2.68503 | 35.18645 | 0 | 12/20/2007 |
| -2.97884 | 35.06654 | 0 | 12/20/2007 |
| -2.98597 | 35.04215 | 0 | 12/20/2007 |
| -2.94329 | 35.01154 | 0 | 12/20/2007 |
| -2.80463 | 35.16127 | 0 | 12/20/2007 |
| -2.86163 | 35.16541 | 0 | 12/20/2007 |
| -2.91323 | 35.1074 | 0 | 12/20/2007 |
| -2.90742 | 35.06046 | 0 | 12/20/2007 |
| -2.90412 | 35.15455 | 0 | 12/20/2007 |
| -2.97121 | 35.06953 | 0 | 12/20/2007 |
| -2.82101 | 35.12096 | 0 | 12/30/2008 |
| -2.68503 | 35.18645 | 0 | 12/30/2008 |
| -2.97884 | 35.06654 | 0 | 12/30/2008 |
| -2.98597 | 35.04215 | 0 | 12/30/2008 |
| -2.94329 | 35.01154 | 0 | 12/30/2008 |
| -3.02324 | 34.92846 | 0 | 12/30/2008 |
| -2.60476 | 35.03505 | 0 | 12/30/2008 |
| -2.57287 | 35.04542 | 0 | 12/30/2008 |
| -2.80463 | 35.16127 | 0 | 12/30/2008 |
| -2.86163 | 35.16541 | 0 | 12/30/2008 |
| -2.91323 | 35.1074 | 0 | 12/30/2008 |
| -2.90742 | 35.06046 | 0 | 12/30/2008 |
| -2.90412 | 35.15455 | 0 | 12/30/2008 |
| -2.97121 | 35.06953 | 0 | 12/30/2008 |
| -2.84485 | 35.21699 | 0 | 12/30/2008 |
| -2.77589 | 35.22949 | 0 | 12/30/2008 |
| -2.65586 | 35.33615 | 0 | 12/30/2008 |
| -2.82101 | 35.12096 | 0 | 12/30/2009 |
| -2.68503 | 35.18645 | 0 | 12/30/2009 |
| -2.97884 | 35.06654 | 0 | 12/30/2009 |
| -2.98597 | 35.04215 | 0 | 12/30/2009 |
| -2.94329 | 35.01154 | 0 | 12/30/2009 |
| -3.02324 | 34.92846 | 0 | 12/30/2009 |
| -2.60476 | 35.03505 | 0 | 12/30/2009 |
| -2.57287 | 35.04542 | 0 | 12/30/2009 |
| -2.80463 | 35.16127 | 0 | 12/30/2009 |
| -2.86163 | 35.16541 | 0 | 12/30/2009 |
| -2.91323 | 35.1074 | 0 | 12/30/2009 |
| -2.90742 | 35.06046 | 0 | 12/30/2009 |
| -2.90412 | 35.15455 | 0 | 12/30/2009 |
| -2.97121 | 35.06953 | 0 | 12/30/2009 |
| -2.84485 | 35.21699 | 0 | 12/30/2009 |
| -2.77589 | 35.22949 | 0 | 12/30/2009 |
| -2.65586 | 35.33615 | 0 | 12/30/2009 |
| -2.82101 | 35.12096 | 0 | 12/30/2010 |
| -2.68503 | 35.18645 | 0 | 12/30/2010 |
| -2.97884 | 35.06654 | 0 | 12/30/2010 |
| -2.98597 | 35.04215 | 0 | 12/30/2010 |
| -2.94329 | 35.01154 | 0 | 12/30/2010 |
| -3.02324 | 34.92846 | 0 | 12/30/2010 |
| -2.60476 | 35.03505 | 0 | 12/30/2010 |
| -2.57287 | 35.04542 | 0 | 12/30/2010 |
| -2.80463 | 35.16127 | 0 | 12/30/2010 |
| -2.86163 | 35.16541 | 0 | 12/30/2010 |
| -2.91323 | 35.1074 | 0 | 12/30/2010 |
| -2.90742 | 35.06046 | 0 | 12/30/2010 |
| -2.90412 | 35.15455 | 0 | 12/30/2010 |
| -2.97121 | 35.06953 | 0 | 12/30/2010 |
| -2.84485 | 35.21699 | 0 | 12/30/2010 |
| -2.77589 | 35.22949 | 0 | 12/30/2010 |
| -2.65586 | 35.33615 | 0 | 12/30/2010 |
| -2.82101 | 35.12096 | 0 | 12/30/2011 |
| -2.68503 | 35.18645 | 0 | 12/30/2011 |
| -2.97884 | 35.06654 | 0 | 12/30/2011 |
| -2.98597 | 35.04215 | 0 | 12/30/2011 |
| -2.94329 | 35.01154 | 0 | 12/30/2011 |
| -3.02324 | 34.92846 | 0 | 12/30/2011 |
| -2.60476 | 35.03505 | 0 | 12/30/2011 |
| -2.57287 | 35.04542 | 0 | 12/30/2011 |
| -2.80463 | 35.16127 | 0 | 12/30/2011 |
| -2.86163 | 35.16541 | 0 | 12/30/2011 |
| -2.91323 | 35.1074 | 0 | 12/30/2011 |
| -2.90742 | 35.06046 | 0 | 12/30/2011 |
| -2.90412 | 35.15455 | 0 | 12/30/2011 |
| -2.97121 | 35.06953 | 0 | 12/30/2011 |
| -2.84485 | 35.21699 | 0 | 12/30/2011 |
| -2.77589 | 35.22949 | 0 | 12/30/2011 |
| -2.65586 | 35.33615 | 0 | 12/30/2011 |
| -2.82101 | 35.12096 | 0 | 12/30/2012 |
| -2.68503 | 35.18645 | 0 | 12/30/2012 |
| -2.97884 | 35.06654 | 0 | 12/30/2012 |
| -2.98597 | 35.04215 | 0 | 12/30/2012 |
| -2.94329 | 35.01154 | 0 | 12/30/2012 |
| -3.02324 | 34.92846 | 0 | 12/30/2012 |
| -2.60476 | 35.03505 | 0 | 12/30/2012 |
| -2.57287 | 35.04542 | 0 | 12/30/2012 |
| -2.80463 | 35.16127 | 0 | 12/30/2012 |
| -2.86163 | 35.16541 | 0 | 12/30/2012 |
| -2.91323 | 35.1074 | 0 | 12/30/2012 |
| -2.90742 | 35.06046 | 0 | 12/30/2012 |
| -2.90412 | 35.15455 | 0 | 12/30/2012 |
| -2.97121 | 35.06953 | 0 | 12/30/2012 |
| -2.84485 | 35.21699 | 0 | 12/30/2012 |
| -2.77589 | 35.22949 | 0 | 12/30/2012 |
| -2.65586 | 35.33615 | 0 | 12/30/2012 |
| -2.82101 | 35.12096 | 0 | 12/30/2013 |
| -2.68503 | 35.18645 | 0 | 12/30/2013 |
| -2.97884 | 35.06654 | 0 | 12/30/2013 |
| -2.98597 | 35.04215 | 0 | 12/30/2013 |
| -2.94329 | 35.01154 | 0 | 12/30/2013 |
| -3.02324 | 34.92846 | 0 | 12/30/2013 |
| -2.60476 | 35.03505 | 0 | 12/30/2013 |
| -2.57287 | 35.04542 | 0 | 12/30/2013 |
| -2.80463 | 35.16127 | 0 | 12/30/2013 |
| -2.86163 | 35.16541 | 0 | 12/30/2013 |
| -2.91323 | 35.1074 | 0 | 12/30/2013 |
| -2.90742 | 35.06046 | 0 | 12/30/2013 |
| -2.90412 | 35.15455 | 0 | 12/30/2013 |
| -2.97121 | 35.06953 | 0 | 12/30/2013 |
| -2.84485 | 35.21699 | 0 | 12/30/2013 |
| -2.77589 | 35.22949 | 0 | 12/30/2013 |
| -2.65586 | 35.33615 | 0 | 12/30/2013 |
| -2.82101 | 35.12096 | 0 | 12/30/2014 |
| -2.68503 | 35.18645 | 0 | 12/30/2014 |
| -2.97884 | 35.06654 | 0 | 12/30/2014 |
| -2.98597 | 35.04215 | 0 | 12/30/2014 |
| -2.94329 | 35.01154 | 0 | 12/30/2014 |
| -3.02324 | 34.92846 | 0 | 12/30/2014 |
| -2.60476 | 35.03505 | 0 | 12/30/2014 |
| -2.57287 | 35.04542 | 0 | 12/30/2014 |
| -2.80463 | 35.16127 | 0 | 12/30/2014 |
| -2.86163 | 35.16541 | 0 | 12/30/2014 |
| -2.91323 | 35.1074 | 0 | 12/30/2014 |
| -2.90742 | 35.06046 | 0 | 12/30/2014 |
| -2.90412 | 35.15455 | 0 | 12/30/2014 |
| -2.97121 | 35.06953 | 0 | 12/30/2014 |
| -2.84485 | 35.21699 | 0 | 12/30/2014 |
| -2.77589 | 35.22949 | 0 | 12/30/2014 |
| -2.65586 | 35.33615 | 0 | 12/30/2014 |
| -2.82101 | 35.12096 | 0 | 12/30/2015 |
| -2.68503 | 35.18645 | 0 | 12/30/2015 |
| -2.97884 | 35.06654 | 0 | 12/30/2015 |
| -2.98597 | 35.04215 | 0 | 12/30/2015 |
| -2.94329 | 35.01154 | 0 | 12/30/2015 |
| -3.02324 | 34.92846 | 0 | 12/30/2015 |
| -2.60476 | 35.03505 | 0 | 12/30/2015 |
| -2.57287 | 35.04542 | 0 | 12/30/2015 |
| -2.80463 | 35.16127 | 0 | 12/30/2015 |
| -2.86163 | 35.16541 | 0 | 12/30/2015 |
| -2.91323 | 35.1074 | 0 | 12/30/2015 |
| -2.90742 | 35.06046 | 0 | 12/30/2015 |
| -2.90412 | 35.15455 | 0 | 12/30/2015 |
| -2.97121 | 35.06953 | 0 | 12/30/2015 |
| -2.84485 | 35.21699 | 0 | 12/30/2015 |
| -2.77589 | 35.22949 | 0 | 12/30/2015 |
| -2.65586 | 35.33615 | 0 | 12/30/2015 |

**Table S3.** Rank correlation values (Kendall’s tau) between species’ relative abundance in plots and plot scores for axes 1 – 3 from an ordination using non-metric multidimensional scaling (see main text of paper). Species which occurred in the rhino forage plots (i.e., Manley Selection Index – figure 3 in main text) but were removed from the NMDS because of infrequent occurrence across plots are shown at the bottom of the table (numbers 61 – 73, below).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NUMBER | SPECIES\_CODE | SPECIES | Axis 1 | Axis 2 | Axis 3 |
| 1 | abutsp | *Abutilon species* | 0.02 | 0.12 | 0.01 |
| 2 | acadre | *Acacia drepanolobium* | -0.03 | -0.05 | -0.05 |
| 3 | acarob | *Acacia robusta* | -0.02 | 0.02 | -0.06 |
| 4 | acasie | *Acacia sieberiana* | 0.12 | -0.01 | 0.11 |
| 5 | acator | *Acacia tortilis* | -0.02 | -0.04 | -0.13 |
| 6 | achasp | *Achyranthes aspera* | 0.04 | 0.14 | -0.02 |
| 7 | albhar | *Albizia harveyi* | -0.08 | 0.07 | 0.05 |
| 8 | ariado | *Aristida adoensis* | 0.14 | 0.02 | 0.06 |
| 9 | aspmos | *Aspilia mossambicensis* | 0.05 | 0.12 | 0.06 |
| 10 | balaeg | *Balanites aegyptica* | 0.02 | -0.04 | 0.02 |
| 11 | blesp | *Blepharis species* | 0.11 | -0.06 | 0 |
| 12 | botins | *Bothriochloa insculpta* | 0.32 | 0.03 | 0.23 |
| 13 | botlon | *Bothriocline longipes* | 0.05 | -0.13 | -0.09 |
| 14 | cassp | *Cassia species* | -0.08 | 0.03 | 0.02 |
| 15 | chlgay | *Chloris gayana* | -0.32 | 0.02 | -0.24 |
| 16 | chlpyc | *Chloris pycnothrix* | 0.09 | -0.39 | -0.23 |
| 17 | chlrox | *Chloris roxburghiana* | -0.05 | 0.15 | -0.14 |
| 18 | chrori | *Chrysochloa orientalis* | -0.04 | -0.13 | -0.01 |
| 19 | comben | *Commelina benghalensis* | 0.03 | 0.03 | 0.03 |
| 20 | comtro | *Commiphora africana* | -0.05 | 0 | -0.01 |
| 21 | cymexc | *Cymbopogon caesius* | 0.11 | 0.01 | 0.23 |
| 22 | cyndac | *Cynodon dactylon* | 0.2 | 0.52 | -0.1 |
| 23 | dacaeg | *Dactyloctenium aegyptium* | -0.04 | -0.09 | -0.12 |
| 24 | digmac | *Digitaria macroblephara* | -0.09 | -0.1 | 0.05 |
| 25 | digsca | *Digitaria scalarum* | 0.21 | 0.15 | 0.04 |
| 26 | doltri | *Dolichos trilobus* | 0.26 | 0.09 | 0.17 |
| 27 | enncen | *Enneapogon cenchroides* | 0.21 | 0.02 | 0.15 |
| 28 | erarac | *Eragrostis racemosa* | 0 | -0.05 | -0.16 |
| 29 | eraten | *Eragrostis tenuifolia* | -0.2 | -0.11 | -0.17 |
| 30 | eupina | *Euphorbia inaequilatera* | 0.02 | -0.05 | 0.03 |
| 31 | euspas | *Eustachys paspaloides* | 0.28 | -0.08 | 0.08 |
| 32 | gutcor | *Gutenbergia cordifolia* | -0.02 | -0.01 | -0.36 |
| 33 | harsch | *Harpachne schimperi* | 0.02 | -0.03 | 0.04 |
| 34 | hetcon | *Heteropogon contortus* | 0.09 | -0.04 | 0.05 |
| 35 | hibsp | *Hibiscus species* | 0.19 | 0.13 | 0.11 |
| 36 | indbas | *Indigofera basiflora* | 0.38 | 0.02 | 0.07 |
| 37 | indvol | *Indigofera volkensii* | 0.16 | -0.02 | 0.08 |
| 38 | jusbet | *Justicia betonica* | -0.04 | 0.03 | 0.11 |
| 39 | jusmat | *Justicia matemensis* | 0.1 | -0.16 | 0.05 |
| 40 | leudef | *Leucas deflexa* | -0.07 | -0.05 | -0.12 |
| 41 | melova | *Melhania ovata* | 0.05 | 0 | 0.06 |
| 42 | mickun | *Microchloa kunthii* | -0.03 | -0.09 | 0.03 |
| 43 | ortpar | *Orthosiphon parvifolius* | 0.1 | 0.03 | 0.02 |
| 44 | pancol | *Panicum coloratum* | -0.16 | 0.03 | 0.01 |
| 45 | panmax | *Panicum maximum* | -0.04 | 0.17 | -0.05 |
| 46 | penmez | *Pennisetum mezianum* | -0.58 | 0.03 | 0.31 |
| 47 | setpum | *Setaria pumila* | 0.15 | -0.05 | 0.04 |
| 48 | setsph | *Setaria sphacelata* | 0.13 | 0.05 | 0.08 |
| 49 | sidcun | *Sida cuneifolia* | 0 | 0 | 0.13 |
| 50 | solinc | *Solanum incanum* | 0.19 | 0.22 | -0.14 |
| 51 | spoafr | *Sporobolus africanus* | 0.1 | -0.05 | 0.1 |
| 52 | spofes | *Sporobolus festivus* | 0.06 | -0.17 | -0.11 |
| 53 | spofim | *Sporobolus fimbriatus* | 0 | -0.1 | 0.05 |
| 54 | spoioc | *Sporobolus ioclados* | 0.02 | -0.18 | 0.03 |
| 55 | spopel | *Sporobolus pellucidus* | -0.03 | -0.13 | -0.17 |
| 56 | spopyr | *Sporobolus pyramidalis* | -0.06 | -0.03 | -0.01 |
| 57 | teppum | *Tephrosia pumila* | 0.14 | 0.03 | 0.08 |
| 58 | thetri | *Themeda triandra* | -0.04 | -0.42 | 0.22 |
| 59 | versp | *Vernonia species* | 0.06 | -0.04 | 0.02 |
| 60 | vigobl | *Vigna oblongifolium* | -0.14 | 0 | -0.08 |
| 61 | comafr | *Commelina africana* | NA | NA | NA |
| 62 | crobar | *Crotalaria barkae* | NA | NA | NA |
| 63 | diglon | *Digitaria longiflora* | NA | NA | NA |
| 64 | hypdis | *Hyperthelia dissoluta* | NA | NA | NA |
| 65 | jussp | *Justicia species* | NA | NA | NA |
| 66 | kohasp | *Kohautia aspera* | NA | NA | NA |
| 67 | lipjav | *Lippia javanica* | NA | NA | NA |
| 68 | maepar | *Maerua parvifolius* | NA | NA | NA |
| 69 | perset | *Persicaria setosula* | NA | NA | NA |
| 70 | setver | *Setaria verticillata* | NA | NA | NA |
| 71 | sonsp | *Sonchus species* | NA | NA | NA |
| 72 | sposta | *Sporobolus stapfianus* | NA | NA | NA |
| 73 | zizaby | *Ziziphus abyssinica* | NA | NA | NA |

**Table S4.** Top 14 species ranked by relative read abundance (RRA) of plant taxa found in 15 rhino dung samples collected in the Moru area of Serengeti National Park. See Appendix S1 for a description of the methods used to obtain DNA sequence data. ‘PACMAD sp.’ refers to those species in one of the two major clades of grasses belonging to the Panicoideae, Arundinoideae, Chloridoideae, Micrairoideae, Aristidoideae, and Danthonioideae.

|  |  |  |
| --- | --- | --- |
| **Rank** | **Taxon** | **RRA** |
| **1** | Indigofereae | 12.65 |
| **2** | *Indigofera* sp. TRK-2015 | 10.96 |
| **3** | *Acacia sp*. (synonym = *Vachellia* sp.) | 9.76 |
| **4** | *Crotalaria* sp. | 9.41 |
| **5** | *Solanum* sp. | 8.30 |
| **6** | PACMAD sp. | 4.92 |
| **7** | Bignoniaceae | 4.37 |
| **8** | *Achyranthes aspera* | 4.19 |
| **9** | *Euphorbia* sp. | 3.22 |
| **10** | Malvoideae | 2.66 |
| **11** | *Hibiscus* sp. | 2.64 |
| **12** | *Phyllanthus* sp. | 2.52 |
| **13** | *Cordia* sp. | 2.38 |
| **14** | *Neonotonia wightii* | 2.17 |