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Data Article

Fungal diversity and ecosystem function data from wine fermentation vats and microcosms

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ABSTRACT

Grape must is the precursor to wine, and consists of grape juice and its resident microbial community. We used Illumina MiSeq® to track changes in must fungal community composition over time in winery vats and laboratory microcosms. We also measured glucose consumption and biomass in microcosms derived directly from must, and glucose consumption in artificially assembled microcosms. Functional impacts of individual must yeasts in artificially assembled communities were calculated using a "keystone index," developed for "Species richness influences wine ecosystem function through a dominant species" [1]. Community composition data and functional measurements are included in this article. DNA sequences were deposited in GenBank (GenBank: SRP073276). Discussion of must succession and ecosystem functioning in must are provided in [1].

Specifications Table

Subject area	*Biology*
More specific subject area	*Ecology, Microbiology, Mycology, Oenology*
Type of data	*Tables*

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How data was acquired	*Illumina MiSeq® sequencing; colorimetric glucose (HK) assay kit; microbalance weighing; colony-forming unit (CFU) counting*
Data format	*Raw and analysed*
Experimental factors	*Fermentation age in winery vats; inoculum dilution in microcosms; added genus in artificially assembled communities*
Experimental features	*Fermenting grape must from winery vats and laboratory microcosms was sequenced for fungal-specific amplicons. Glucose and biomass were measured in microcosms. Glucose was also measured in artificially assembled communities derived from individual yeast isolates and microcosms.*
Data source location	*San Polino Winery, Montalcino, Italy*
Data accessibility	*Data are within this article. Raw sequence data are available at GenBank via the accession number GenBank: SRP073276.*

Value of the data

- This dataset is one of very few must fungal datasets measured over successional time using high-throughput sequencing.
- Fungal succession over time in fermenting must can be contrasted with datasets. from different winery environments or gathered using different enumeration techniques (*e.g.,* culture-dependent enumeration).
- Measured sugar utilization of yeasts and microbial communities can serve as a starting point for studies of yeast function during wine development.
- The keystone index can be used to compare disproportionate functional impacts among microbes from a variety of environments.

1. Data

Data include fungal DNA amplicon sequences, OTUs, and taxonomic data from fermenting must in a winery, in a laboratory microcosm experiment, and in control communities. Associated experimental and metadata are provided in separate tables. Experimental data include microcosm biomass and glucose concentrations, plus the data needed to calculate a "keystone index," described in [1] below, for twenty microcosm yeast isolates. Metadata include winery vat identity, fermentation age, microcosm treatment, microcosm age, and microcosm replicate.

2. Experimental design, materials and methods

2.1. Fermenting grape must

All must samples were collected in October and November, 2013 from the San Polino winery in Montalcino, Italy. All winery fermentation vats were filled with must from Sangiovese grapes harvested from five vineyards, all within 5 km of the winery. Vat volumes range from 3000 to 3800 l. We collected must samples from five vats approximately every 12–24 h over 13 days starting from the day the first vat was completely filled. One ml of grape must was collected at each timepoint. To prevent further fermentation during storage and transport, we centrifuged must samples for 5 min at 6000 rpm in a tabletop microcentrifuge and fixed the pelleted cells in 250–500 µl 100% ethanol. Samples were stored at ambient temperature until DNA extraction (19 days or less), and alcohol was removed from each sample before DNA extraction. DNA was extracted using the MasterPure™ Yeast DNA Purification Kit (Epicentre, Madison, Wisconsin, USA) following the manufacturer's instructions.

Must samples were also collected from six vats or vat mixtures once fermentation was completed, after the winemakers had filtered the fermented must. Post-filtration samples were transported at