Fourier transformed infrared spectroscopy (FT-IR) is a common method of qualitative and quantitative chemical analysis. FT-IR has been recently used for wine industry as a fast technique for routine control parameters such as pH, total acidity, volatile acidity and alcoholic degree (1). Detection and identification of microorganisms in food products is a new application. Microorganisms involved in winemaking process are mainly Saccharomyces cerevisiae (alcoholic fermentation), lactic bacteria (malolactic fermentation) and acetic bacteria (wine oxidation and degradation) (2,3,4,5). The aim of this research was to compare different methodologies and equipments to acquire spectral data to detect chemical differences between yeast strains, attenuated total reflectance fourier transform infrared spectroscopic (ATR FT-IR) and microspectroscopy (ATR IRMS). Wine industry is in need for applying a rapid method to detect microorganisms in order to prevent stop fermentations and cross contaminations. Infrared spectroscopy techniques combined with multivariate analysis could meet these demands.

RESULTS

Class projections illustrate the ability of SIMCA to differentiate IR data. Infrared spectra analysis (800-1500 cm⁻¹) obtained by ATR IRMS of different S. cerevisiae strains permitted tight clustering and clear differentiation among clusters (Figure 3a). Discriminating power of SIMCA showed tree strong spectral bands at 1068 cm⁻¹ (figure 3), 1421 cm⁻¹ (figure 3) and 985 cm⁻¹ (Figure 4) located in the yeast fingerprint region. (1500 cm⁻¹, 1438 cm⁻¹ and ~1168 cm⁻¹). These bands were associated to amide II (amino groups) and amide III (amide groups) of mannanproteins present in their cell wall, -CH2 and -CH3 deformation of proteins and lipids, and C=O-C stretching of polysaccharides (β 1→3 glucans, respectively (6).

In the case of infrared spectra obtained by ATR FT-IR (Figure 4) a tight clustering and clear differentiation among strains was also observed (Figure 4a) and IR bands were collected from 4000 to 800 cm⁻¹ with a resolution of 4 cm⁻¹ co-adding 128 scans to improve the signal-to-noise ratio.

CONCLUSIONS

This study shows that ATR-IRMS and ATR FT-IR combined with multivariate analysis are valuable techniques to detect and discriminate different S. cerevisiae strains.

These techniques is going to be tested as a tool to detect cross contaminations by acetic bacteria in winemaking or bottling process.

REFERENCES