

# THE DETERMINATION OF THE ASH-FREE DRY WEIGHT OF NET-ZOOPLANKTON UNDER DIFFERENT TEMPERATURES

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## Abstract

Statistical analyses of the data achieved by combustion of zooplankton samples at two temperatures have been performed. Since the difference between the ash weight 500°C and 800°C is non-significant it can be recommended that the method of determination of ash-free dry weight should be at the temperature of 800°C.

In zooplankton biomass investigations, one of the widely used methods is determination of dry weight and ash-free dry weight used as organic content of zooplankton. While a temperature of 60°C is widely accepted for the determination of dry weight (Lovegrove, 1966), the procedure for the determination of ash-free dry weight has been carried out at temperatures varying from 400°C to 800°C. Various authors recommend that the procedure for dry-ashing plankton organisms should be carried out at approximately 500°C (e.g. Be, et al., 1971; Hirata, 1972), but Lovegrove (1966) has recommended temperature of 800°C.

As a part of the zooplankton biomass investigations of the Adriatic Sea, during 1973 and 1974 one hundred samples have been processed at temperatures of 500°C and 800°C.

Zooplankton samples from coastal as well as offshore waters were collected by vertical towing of the IOSN plankton net equipped with 250 µm mesh netting. Samples originate from July, August, September, October, November and December of 1973 and January, February and March of 1974. After determination of dry weight (60°C) combustion was carried out in an electric muffle equipped with a sensitive temperature control. After combustion at a temperature of 500°C samples were weighed and then raised to combustion at a temperature of 800°C. These samples were placed in a cool muffle, the temperature was slowly raised at 800°C and held there for one half-hour. After cooling, the samples were weighed again. Weighing was carried out using an electrobalance Mettler H 10 T, readability 0,1 mg.

The quantitative data ranges are shown in table 1. Zooplankton mainly consisted of copepods and on only a few occasions were there less than 40% copepods within the sample.

Table 1. Minimum, maximum and average net-zooplankton biomass values

	dry w. mg/m <sup>2</sup>	ash w. mg/m <sup>2</sup> 500°C	ash w. mg/m <sup>2</sup> 800°C	Tot.No. ind./m <sup>2</sup>	Copepods % of sample
Minimum	36,10	7,30	7,30	6400	34,7
Maximum	760,20	233,10	234,00	149940	92,8
Average	260,25	50,15	49,85	50500	63,3
St.dev.	175,51	46,10	46,24	21842	15,6

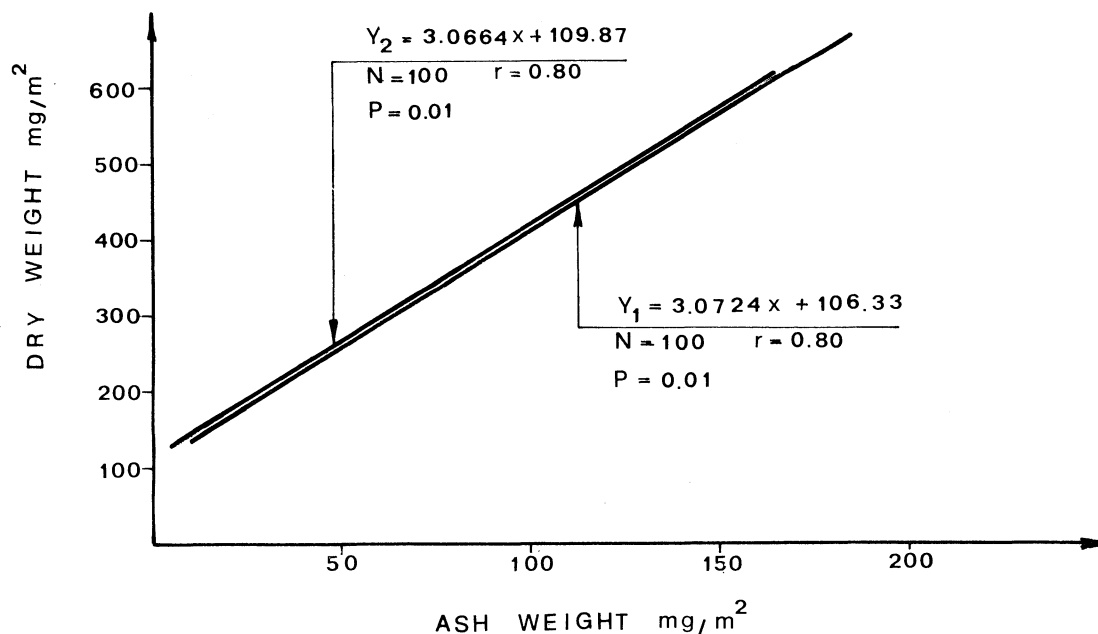


Fig. 1. Relationship between dry weight and ash-free dry weights at temperatures of 500°C ( $Y_1$ ) and 800°C ( $Y_2$ ). Data indicated at table 1.

The linear regression analyses (Fig. 1) of the dry weight and ash-weights show a high correlation between variables and a constant difference between ash weight values.

Using the statistical test of differences between means where  $\bar{x}_1$  = ash weight 500°C, and  $\bar{x}_2$  = ash weight 800°C it is:

$$\sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\sigma_{\bar{x}_1}^2 + \sigma_{\bar{x}_2}^2} = \sqrt{4,610^2 + 4,624^2} = 6,53 \quad (1)$$

where standard error of the mean is:  $\sigma_{\bar{x}} = \frac{S}{\sqrt{N}}$  (2)

$S$  = the computed standard deviation,  $N$  = the sample size

the relationship between the difference and its error ( $t$ ) is:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sigma_{\bar{x}_1 - \bar{x}_2}} = \frac{0,3}{6,53} = 0,05 \quad (3)$$

Because the limit value for ( $t$ ) (at  $P=0,01$ , and  $N=100$ ) is 2,63, the existing difference between ash weight values at 500°C and 800°C is non-significant.

Following this conclusion it can be recommended the combustion of zooplankton is carried out at a standard temperature of 800°C. The procedure of the determination of ash-free dry weight at 800°C is very acceptable because of the short time (about 3 hrs) required for complete analyses. This saving of time is obtained regardless of the size of the samples being processed.

#### Literature:

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