

CHAPTER 7

STUDY OF OTHER BIOAVAILABLE TRACE METALS

In chapter 6, iron and chromium were studied as important trace elements. Other trace elements like copper, zinc and manganese are discussed in this chapter. In water extract as well as in acid digested samples, metals were detected using Atomic Absorption spectroscopy.

7.1 ESTIMATION OF ZINC

Zinc is very important metal in biological system. For this study water extract and acid digested samples both were prepared. The result showed that considerable amount of zinc was found in acid digested samples of GS, TF and PG in high amounts (Table 7.1).

While in case of water extracts, it was present in reasonable amount in GS and PG, whereas total amount of zinc may not be bioavailable in water extract of TF (Table 7.2). Most of the bioavailable zinc was also found in water extract of AS, that was about one fifth of its total zinc content. Also MC had considerable zinc and one fourth of total was water soluble.

In case of acid digested sample of *Adiantum capillus veneris*, an average amount of zinc was found and it was about one tenth of the total in case of water extract (Fig. 7.1).

7.2 ESTIMATION OF COPPER

Comparatively high concentration of copper was detected in acid digested sample of GS, TF and CI (about 0.03 mg/g) and highest (0.035 mg/g) in PG (Table 7.3).

Lower concentration of metal was observed in water extract of these samples as compared to acid digested only GS, SH showed some reasonable concentration and similar amount was found in MC and PG. Maximum percentage of soluble copper was found in GS, SH and MC . Water extract of these species may be used as copper supplement (Table 7.4).

Acid digested samples of PG, TF and CI have produced a large concentration of copper, so can be served as a supplement of copper. GS in either form is a good source of copper (Fig. 7.2).

Adiantum capillus veneris does not have a considerable amount of copper in any case.

7.3 ESTIMATION OF MANGANESE

Another important trace metal is manganese. It is also detected in the same manner as the above metals are treated. The result showed that the highest amount of manganese was found in GS in its water extract as well as in acid digested samples (Table 7.5-7.6 and Fig. 7.3).

CI also showed high amount of manganese in both cases. SH and PL had average concentration of manganese in acid digested samples as well as in water extract. PG and EC showed the maximum concentration of the metal present in these samples were water soluble. Therefore the water extract of all the samples mentioned above may preferred for manganese as a biological activator.

Adiantum capillus veneris has an average concentration of manganese and 25% of which was found water soluble.

DISCUSSION

Over all metal contents of these samples showed that the richest sample with respect to metals is GS which has all the essential metals in reasonable amounts. In this sample about 10% of the metal contents were found soluble in water.

The iron content is generally found in excess in non-antidiabetic samples. The soluble iron was in excess in karela, karanjwa, paneer booty and garlic. In CI water extract does not have much iron therefore may be non suitable as compared to its acid extract.

Water soluble copper was only present in GS and SH. PG, TF and CI also showed a high amount of copper but not available in water extract.

Zinc was found in high content in most of the herbs except EJ, CI, SH and HR. Water soluble zinc was also in excess in GS.

Manganese, in GS, SH, CI, PL, EC and HR, was in detectable amount. Only chromium was not found in detectable amount in any of the samples.

Adiantum capillus veneris showed an average concentration of iron, zinc and manganese whereas low concentration of copper and chromium.

TABLE 7.1**Estimation of Zinc in Acid Digested Samples**

Sample ID	Quantity found mg/g	SD	RSD %
ACV	0.0620	0.004	1.60
MC	0.0723	0.007	2.40
EJ	0.0278	0.001	0.90
GS	0.1070	0.003	0.70
AS	0.0573	0.002	0.90
TF	0.1108	0.013	2.90
PG	0.0968	0.008	2.10
SH	0.0680	0.012	4.40
CI	0.0690	0.001	0.40
EC	0.0485	0.007	2.10
PL	0.0703	0.003	1.10
HR	0.0570	0.004	1.80

TABLE 7.2**Estimation of Zinc in Water Extract of Samples**

Sample ID	Quantity found mg/g	SD	RSD %
ACV	0.0062	0.006	2.40
MC	0.0189	0.015	2.00
EJ	0.0045	0.001	0.60
GS	0.0116	0.008	1.70
AS	0.0171	0.002	0.30
TF	0.0016	0.002	3.10
PG	0.0148	0.016	2.70
SH	0.0080	0.000	0.00
CI	0.0058	0.001	0.40
EC	0.0105	0.001	0.20
PL	0.0037	0.004	2.70
HR	0.0029	0.001	0.90

TABLE 7.3**Estimation of Copper in Acid Digested Samples**

Sample ID	Quantity found mg/g	SD	RSD %
ACV	0.0102	0.007	1.70
MC	0.0172	0.020	2.90
EJ	0.0168	0.008	1.20
GS	0.0293	0.015	1.30
AS	0.0102	0.010	2.50
TF	0.0267	0.002	0.20
PG	0.0345	0.014	1.00
SH	0.0223	0.012	1.30
CI	0.0309	0.016	1.30
EC	0.0119	0.004	0.80
PL	0.0155	0.013	2.10
HR	0.0107	0.004	0.90

TABLE 7.4**Estimation of Copper in Water Extract of Samples**

Sample ID	Quantity found mg/g	SD	RSD %
ACV	0.0004	0.002	1.70
MC	0.0027	0.004	2.90
EJ	0.0020	0.001	1.00
GS	0.0031	0.002	1.30
AS	0.0013	0.001	1.60
TF	0.0011	0.002	6.70
PG	0.0024	0.003	2.70
SH	0.0035	0.001	0.60
CI	0.0014	0.004	5.60
EC	0.0014	0.003	4.20
PL	0.0010	0.003	5.80
HR	ND	-----	-----

TABLE 7.5**Estimation of Manganese in Acid Digested Samples**

Sample ID	Quantity found mg/g	SD	RSD %
ACV	0.0565	0.004	1.30
MC	0.0363	0.004	2.80
EJ	0.0095	0.001	0.30
GS	0.6123	0.003	0.00
AS	0.0178	0.018	2.50
YF	0.0280	0.013	1.80
PG	0.0425	0.008	3.60
SH	0.1010	0.000	0.00
CI	0.1520	0.001	0.20
EC	0.3070	0.016	1.30
PL	0.1275	0.003	0.80
HR	0.0948	0.004	0.80

TABLE 7.6**Estimation of Manganese in Water Extract of Samples**

Sample ID	Quantity found mg/g	SD	RSD %
ACV	0.0095	0.007	1.90
MC	0.0077	0.004	1.30
EJ	0.0030	0.006	5.10
GS	0.0701	0.020	0.70
AS	0.0085	0.002	0.60
TF	0.0011	0.004	9.50
PG	0.0106	0.005	1.20
SH	0.0106	0.012	2.80
CI	0.0270	0.013	1.20
EC	0.0474	0.028	1.50
PL	0.0208	0.044	0.50
HR	0.0085	0.001	0.30

FIGURE 7.1

**Comparison of Zinc in
Water Extract and Acid Digested Samples**

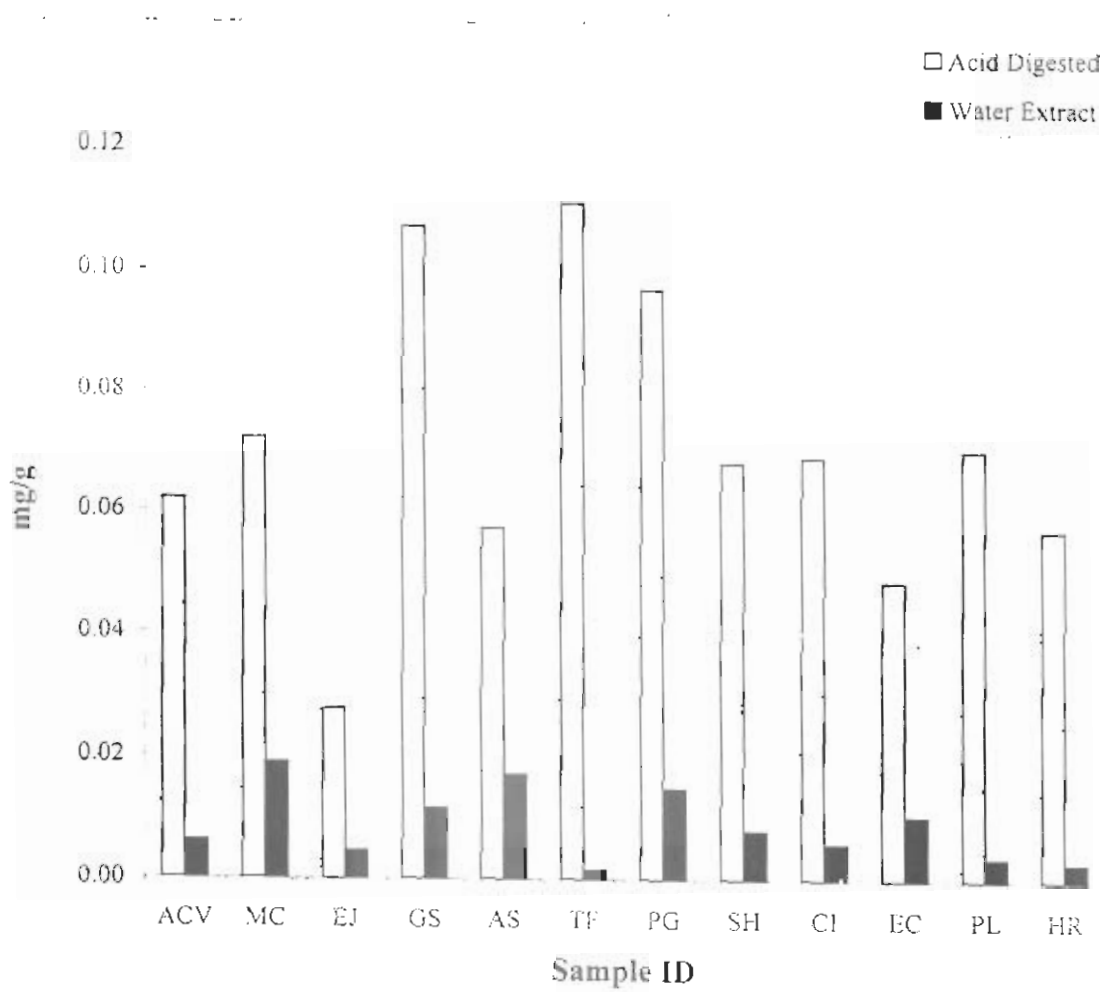


FIGURE 7.2

**Comparison of Copper in
Water Extract and Acid Digested Samples**

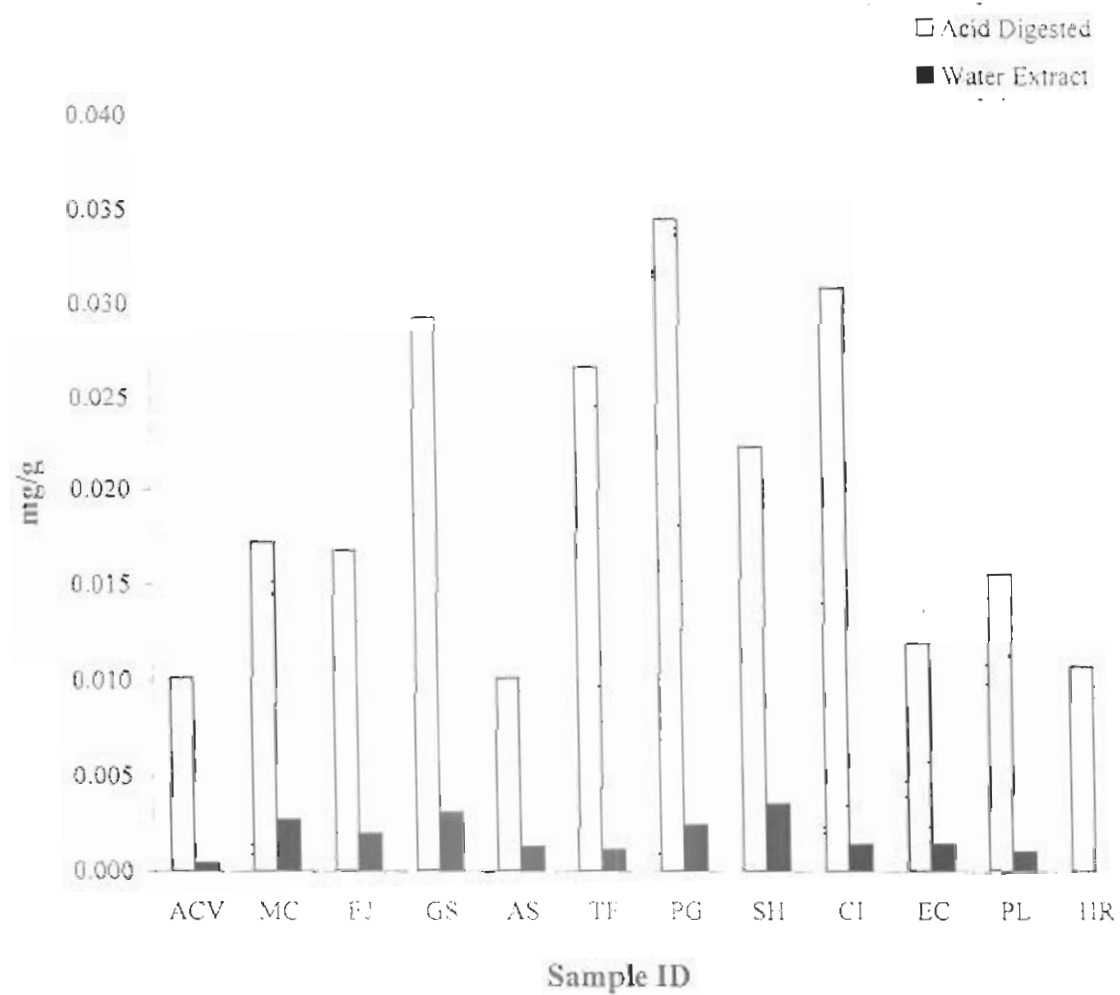


FIGURE 7.3

**Comparison of Manganese in
Water Extract and Acid Digested Samples**

