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Research Article

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Effect of magnesium sources on dry matter yield and plant nutrients content of wheat (*Triticum aestivum* L.), barley (*Hordeum vulgare* L.) and maize (*Zea mays* L.) crops varieties

■ R. S. GARHWAL AND J. R. JAT

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MEMBERS OF RESEARCH FORUM:

Corresponding author :
R. S. GARHWAL, Department of Soil Science, College of Agriculture, (C.C.S.H.A.U.), Kaul, KAITHAL (HARYANA) INDIA
Email: rsg.rca2011@gmail.com

Co-authors :
J. R. JAT, Department of Soil Science, C.P. College of Agriculture, (SDAU), Dantiwada, BANASKANTHA (GUJARAT) INDIA

Summary

A pot experiments were conducted during 2005-06 in *Rabi* seasons at MPUAT, Udaipur (Rajasthan) on the response of wheat, barley and maize varieties of magnesium sources on nutrients status of soils, dry matter yield and nutrient content under grown in clay loam and loamy sand soils. The highest content of Ca was observed under varieties GW-322 of wheat, RD-2035 of barley and Pratap M-5 of maize grown soils. More Mg was observed in varieties Lok-1 of wheat, RD-2624 of barley and Aravali M-3 of maize crops grown soils. The maximum Fe, Mn, Cu and Zn were observed in Lok-1 and Navjot varieties of wheat and maize grown soil. The highest Mg, P, S, Fe, Mn, Cu and Zn content estimated with magnesium sulphate application soils while more Ca content was estimated in soil under application of dolomite. Lok-1(3.18 g/pot) varieties of wheat, RD-2645 (2.67 g/pot) of barley and Pratap M-5 (8.24 g/pot) of maize were produced highest dry matter yield. Magnesium sulphate application in wheat, barley and maize crops significantly increased dry matter yield (7.28, 4.35 and 2.94%, respectively) over dolomite application. Dry matter yield significantly increased (5.22%, 9.60% and 19.11% of wheat, barley and maize crops, respectively) with grown in clay loam soil than loamy sand soil. The concentration Mg, Fe, Mn, Cu and Zn significantly higher were observed in variety Lok-1 of wheat and varieties RD-2592 of barley shoot tissue. While, highest Ca concentration was found in variety HI-8498 of wheat and variety RD-2552 of barley plant. However, maximum sulphur in variety Raj.3756 and RD-2624 of wheat and barley, respectively. Highest value of Ca, Mg and sulphur content was found in maize varieties PHEM-2, Aravali Makka-1 and Pratap Makka-3 respectively, while, highest phosphorus, Fe, Mn, Cu and Zn content was found in variety Navjot. Ca content was observed significantly higher with application of dolomite grown crops dry matter.

Key words : Magnesium, Variety, Soil type, Nutrient status

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Introduction

Magnesium is a common constituent in many minerals, comprising 2 per cent of Earth's crust. However, the amount of Mg released from soil minerals is mostly small compared with the amounts needed to sustain high crop yield and quality. Resulting small quantity of available magnesium nutrient in soil occurred their deficiency in soil-plant system. Therefore, application of magnesium fertilizers is crucial for optimal crop production. The farmers do not apply all the plant nutrients which are deficiency in soil; they apply only one or two and seldom all the three primary macro nutrients resulting into poor yields due to imbalance fertilization.

Magnesium is involved in many physiological and biochemical processes; it is an essential element for plant growth and development and plays a key role in plant defence mechanisms in abiotic stress situations (Mengutay *et al*., 2013). The most commonly known function of magnesium in plants is probably its role as the central atom of the chlorophyll molecule in the light-absorbing complex of chloroplasts and its contribution to photosynthetic fixation of carbon dioxide (Cakmak and Yazici, 2010 and Gerendás and Führs, 2013).

Magnesium also serves as a structural component in ribosomes, stabilizing them in the configuration necessary for protein synthesis. As consequence of magnesium deficiency, the portion of protein nitrogen decreases and that of non-protein nitrogen generally increases in the plants. Magnesium is a part of the chlorophyll and augment of phosphate transport in plant system. It increases resistance to harmful environmental influence such as drought and disease. Singh and Pathak (2002) and Srivastava *et al*. (2006) reported positive effect of magnesium addition on wheatand rice crops, respectively. The present studies were carried out to test effect and evaluate the efficiency of various sources of magnesium for important crops, wheat, barley and *Rabi* maize varieties by short term nutrient absorption technique in two important soil types.

Resource and Research Methods

A pot experiments were conducted during 2005-06 in *Rabi* seasons in caly loam and loamy sand soils at Maharana Pratap University of Agriculture and Technology, Udaipur (Raj.) to evaluate efficiency of magnesium sulphate and dolomite as a sources of magnesium on nutrients status of soils, dry matter yield and nutrient content in different wheat barley and maize varieties. The experimental soils (0 to 15 cm depth) were clay loam with pH 8.1, EC 0.52 dSm^{-1} and OC 5.60 g kg^{-1} and loam sand with pH 8.0 and 0.65 dSm^{-1} and OC 4.16 g kg^{-1}. Available N, P and K clay loam soil were 325.20, 18.96 and 310.294 kg ha^{-1}, respectively which were lower present in loamy sand soil 285.87, 17.75 and 288.176 kg ha^{-1}. The treatments consisted of three levels of magnesium (control, 30 kg Mg ha^{-1} by dolomite and 30 kg Mg ha^{-1} by magnesium sulphate), two soil types (clay loam and loamy sand) our three crops ware *viz.*, wheat (Lok-1, GW-322, HI-8498, Raj-3765 and Raj-4037) barley (RD-2592, RD-2624, RD-2503, RD-2035 and RD-2552) and maize (Navjot, PHEM-2, Aravali Makka-1, Pratap Makka-5 and Pratap Makka-3). These treatments were evaluated in Complete Randomized Design with three replications. The available phosphorus was determined by 0.5 M $NaHCO_3$ solution of pH 8.5 method (Olsen *et al.*,1954) and potassium was determined by extraction with normal neutral ammonium acetate and estimated by flame photometer (Metson, 1956). Calcium and magnesium were estimated by versante method. Sulphur was estimated by extraction of heated sample with 1 per cent NaCl followed by turbidometric method (Williams and Steinbergs, 1952). Available Zn, Fe, Cu and Mn contents in soil samples were estimated on AAS (Lindsay and Norvell, 1978). The crops seed sown in quartz sand culture and planted at half inch of depth. The grown period was taken in 21 days in sand culture, fifty ml of magnesium free nutrient solution was added to each culture. After 21 days growth in the sand culture carton, sand culture was shifted to another carton containing 200 g soil in each carton. As per technique in ten days it was able to remove sufficient nutrient from soil.

Research Findings and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Nutrient in soil:

The highest Ca, Mg and available sulphur were observed in wheat varieties GW-322 (9.09 meq 100 g soil-1), Lok-1 (3.91 meq/100 g soil) and HI-8498 (12.27 mg kg^{-1}) grown soil, respectively. Results shows that, highest Fe (4.50 mg kg^{-1}), Mn (8.01 mg kg^{-1}), Cu (1.42

mg kg^{-1}) and Zn (1.50 mg kg^{-1}) content were recorded in varieties Lok-1 grown soil which was significantly higher over varieties Raj-3765 (4.35, 7.78, 1.38 and 1.45 mg kg^{-1}) and Raj-4037 (4.23, 7.68, 1.35 and 1.44 mg kg^{-1}), respectively. The results showed (Table 2) that the highest Ca, Mg and available sulphur were observed in varieties RD-2035 (8.61 meq/100 g soil) RD-2624 (4.28 meq/100 g soil) and RD-2592 (11.81 mg kg^{-1}) of barley grown soil, respectively. Results shows that, highest Fe (4.52 mg kg^{-1}), Mn (7.98 mg kg^{-1}), Cu (1.42 mg kg^{-1}) and Zn (1.50 mg kg^{-1}) content a soil recorded in pot variety RD-2592 and Zn only RD-2624 which was

Table 1 : Effect of Mg sources on soil, Ca, Mg P, K, Fe, Mn, Cu and Zn content after wheat harvest in two different soil types

Treatments	Meq/100 g soil		kg ha^{-1}		(mg kg^{-1})				
	Ca	Mg	P	K	S	Fe	Mn	Cu	Zn
LOK-1	8.38	3.91	21.50	384.4	11.69	4.50	8.01	1.42	1.50
GW-322	9.09	3.64	21.34	389.6	11.89	4.46	7.94	1.41	1.47
HI-8498	8.93	3.65	21.11	385.2	12.27	4.41	7.85	1.38	1.46
Raj-3765	8.65	2.90	20.95	386.2	12.10	4.35	7.78	1.38	1.45
Raj-4037	8.78	3.53	20.70	387.6	11.76	4.23	7.68	1.35	1.44
S.E.±	0.10	0.05	0.20	5.00	0.12	0.04	0.08	0.02	0.02
C.D. (P=0.05)	0.30	0.13	NS	NS	0.34	0.11	0.22	0.04	0.05
Control	8.39	2.93	19.95	385.9	10.53	4.22	7.61	1.34	1.45
Dolomite	9.07	3.65	20.82	387.3	11.79	4.37	7.84	1.381	1.46
Mg SO_4	8.84	3.99	22.58	387.9	13.50	4.58	8.10	1.45	1.49
S.E.±	0.08	0.04	0.16	3.39	0.09	0.03	0.06	0.01	0.01
C.D. (P=0.05)	0.22	0.11	0.45	NS	0.26	0.09	0.17	0.04	0.04
Clay loam	9.22	5.09	22.63	448.7	13.23	4.95	8.99	1.60	1.66
Loamy sand	8.30	1.96	19.60	325.3	10.65	3.84	6.71	1.18	1.26
S.E.±	0.06	0.03	0.13	3.20	0.08	0.03	0.05	0.01	0.01
C.D. (P=0.05)	0.18	0.08	0.37	8.90	0.21	0.07	0.14	0.03	0.03

NS= Non-significant

Table 2 : Effect of Mg sources on soil, Ca, Mg P, K, Fe, Mn, Cu and Zn content after barley harvest in two different soil types

Treatments	Meq/100 g soil		kg ha^{-1}		(mg kg^{-1})				
	Ca	Mg	P	K	S	Fe	Mn	Cu	Zn
RD-2552	8.04	3.63	21.08	336.0	11.81	4.52	7.98	1.42	1.49
RD-2624	8.03	4.28	21.02	3335.7	11.65	4.45	7.90	1.41	1.50
RD-2503	7.85	3.75	20.94	335.3	11.44	4.40	7.81	1.38	1.48
RD-2035	8.61	4.00	20.84	336.1	11.27	4.36	7.73	1.37	1.47
RD-2552	7.91	3.83	20.73	336.6	11.21	4.22	7.70	1.36	1.46
S.E.±	0.09	0.05	0.18	3.50	0.13	0.04	0.10	0.01	0.02
C.D. (P=0.05)	0.25	0.13	NS	NS	0.13	0.13	0.28	0.04	0.05
Control	7.46	3.48	19.93	334.7	10.26	4.22	7.62	1.35	1.46
Dolomite	8.66	3.87	20.53	335.9	11.26	4.37	7.79	1.38	1.48
Mg SO_4	8.15	4.34	22.29	337.3	12.91	4.58	8.07	1.43	1.51
S.E.±	0.07	0.04	0.14	2.70	0.10	0.04	0.08	0.01	0.01
C.D. (P=0.05)	0.19	0.11	0.40	NS	0.27	0.10	0.22	0.03	0.04
Clay loam	8.22	5.73	22.30	348.3	12.57	4.94	8.97	1.59	1.69
Loamy sand	7.95	2.06	19.54	323.7	10.39	3.84	6.68	1.18	1.28
S.E.±	0.06	0.03	0.12	2.20	0.08	0.03	0.06	0.009	0.01
C.D. (P=0.05)	0.16	0.08	0.33	6.20	0.24	0.08	0.08	0.02	0.03

NS= Non-significant

significantly higher over pot of varieties RD-2552 (4.22, 7.70, 1.36 and 1.46 mg kg^{-1}). The highest (Table 3), Fe (4.48 mg kg^{-1}), Mn (7.89 mg kg^{-1}), Cu (1.41 mg kg^{-1}) and Zn (1.50 mg kg^{-1}) were observed in Navjot varieties of maize grown soil. The highest Ca (7.96 meq/100 g soil) and Mg (4.23 meq/100 g soil) were observed in varieties Pratap M-5 and Aravali M-3 raised soil, respectively. While the lowest value of Ca (7.36 meq/100 g soil), Mg (3.28 meq/100 g soil), Fe (4.25 mg kg^{-1}), Mn (7.61 mg kg^{-1}), (Cu 1.35 mg kg^{-1}) and Zn (1.46 mg kg^{-1}).

Soil nutrient content influenced significantly with

Table 3: Effect of Mg sources on soil Ca, Mg, P, K, S, Fe, Mn, Cu and Zn nutrients content after barley harvest in two different soil types

Varieties	Meq/100g soil		Kg/ha		Mg/kg				
	Ca	Mg	P	K	S	Fe	Mn	Cu	Zn
Navjot	7.96	3.58	21.05	336.2	12.78	4.48	7.89	1.41	1.50
PEHM-2	7.79	3.83	20.89	335.4	12.08	4.40	7.84	1.40	1.48
Aravali M-1	7.61	4.23	21.36	335.6	12.44	4.34	7.77	1.38	1.47
Pratap M-5	8.24	3.75	21.23	336.6	12.27	4.32	7.68	1.37	1.47
Pratap M-3	7.36	3.28	21.29	337.0	12.35	4.25	7.61	1.35	1.46
S.E.$\pm$	0.08	0.05	0.23	2.6	0.12	0.05	0.06	0.01	0.01
C.D. (P=0.05)	0.23	0.14	NS	NS	NS	0.15	0.18	0.06	0.04
Control	7.15	3.29	20.06	334.8	10.97	4.22	7.55	1.35	1.46
Dolomite	8.56	3.78	21.05	336.2	12.13	4.33	7.73	1.37	1.47
$MgSO_4$	7.67	4.14	22.37	337.5	13.68	4.53	7.99	1.42	1.50
S.E.$\pm$	0.06	0.04	0.18	2.0	0.09	0.04	0.05	0.01	0.01
C.D. (P=0.05)	0.18	0.11	0.51	NS	0.26	0.11	0.14	0.09	0.03
Clay loam	7.92	5.20	22.32	348.7	13.53	4.89	8.87	1.57	1.68
Loamy sand	7.66	2.26	20.01	323.6	11.00	3.82	6.64	1.18	1.28
S.E.$\pm$	0.05	0.03	0.15	1.6	0.07	0.03	0.04	0.008	0.09
C.D. (P=0.05)	0.15	0.09	0.42	4.6	0.21	0.09	0.11	0.02	0.03

NS= Non-significant

Table 4 : Effect of Mg sources on dry matter yield and nutrients content in wheat varieties

Varieties	DM (g/pot)	Nutrient content (%)					Nutrient content (mg/kg)			
		Ca	Mg	P	K	S	Fe	Mn	Cu	Zn
LOK-1	3.18	0.567	0.344	0.250	1.30	0.209	185.33	44.38	18.27	30.23
GW-322	3.07	0.547	0.312	0.258	1.29	0.216	184.65	44.24	18.12	30.03
HI-8498	1.77	0.820	0.320	0.255	1.28	0.213	183.66	44.10	17.96	29.77
Raj-3756	2.18	0.507	0.309	0.252	1.28	0.219	183.46	43.86	17.56	29.44
Raj-4037	1.58	0.493	0.256	0.260	1.27	0.207	182.62	43.66	17.23	29.13
S.E.$\pm$	0.03	0.008	0.004	0.003	0.014	0.003	1.43	0.50	0.16	0.35
C.D. (P=0.05)	0.08	0.024	0.012	NS	NS	0.007	4.03	1.41	0.46	1.00
Control	2.25	0.500	0.252	0.251	1.27	0.207	182.79	43.36	17.12	28.88
Dolomite	2.38	0.656	0.308	0.255	1.29	0.213	183.89	44.09	17.73	29.81
$MgSO_4$	2.45	0.604	0.365	0.259	1.30	0.218	185.17	44.71	18.36	30.46
S.E.$\pm$	0.02	0.007	0.003	0.003	1.01	0.002	1.10	0.37	0.13	0.27
C.D. (P=0.05)	0.06	0.018	0.009	NS	NS	0.006	3.12	1.09	0.36	0.77
Clay loam	2.42	0.632	0.371	0.264	1.31	0.223	186.06	45.73	18.80	30.72
Loamy sand	2.30	0.451	0.241	0.246	1.26	0.202	181.84	42.38	16.85	28.72
S.E.$\pm$	0.005	0.003	0.002	0.001	0.01	0.001	0.90	0.32	0.10	0.22
C.D. (P=0.05)	0.015	0.007	0.006	0.003	0.03	0.006	2.55	0.89	0.29	0.63

NS= Non-significant

application of magnesium sulphate and dolomite. It is clearly apprant (Table 1, 2 and 3) that the soils hold highest Ca content with application of dolomite while the remaining except potassium, nutrients were obtained significantly higher in soil which was treated with magnesium sulphate. Potassium was found statistically at with in treatments. Both magnesium sources were found significantly superior to control. Magnesium sulphate of soil amendment had positive significant effects on the nutrient content of the determined macro and micronutrients. Similar findings were also reported by (El-Zanaty *et al.*, 2012).

Table 5 : Effect of Mg sources on dry matter yield, and nutrients content in barley varieties

Varieties	DM (g/pot)	Nutrient content (%)					Nutrient content (mg/kg)			
		Ca	Mg	P	K	S	Fe	Mn	Cu	Zn
RD-2592	2.52	0.643	0.362	0.258	1.27	0.214	181.74	42.27	17.08	28.65
RD-2624	2.67	0.747	0.334	0.257	1.28	0.217	181.33	42.07	16.80	28.35
RD-2503	2.09	0.720	0.311	0.255	1.27	0.210	181.07	41.72	16.50	28.06
RD-2035	2.21	0.730	0.280	0.253	1.29	0.208	180.79	41.43	16.23	27.76
RD-2552	1.96	0.780	0.344	0.250	1.26	0.204	180.40	41.07	15.96	27.41
S.E.±	0.03	0.009	0.004	0.003	0.01	0.002	2.02	0.60	0.16	0.34
C.D. (P=0.05)	0.08	0.025	0.011	NS	NS	0.005	5.70	1.69	0.45	0.95
Control	2.17	0.634	0.268	0.249	1.26	0.205	179.92	41.02	15.81	27.34
Dolomite	2.30	0.812	0.321	0.256	1.28	0.210	181.30	41.69	16.42	27.97
$MgSO_4$	2.40	0.736	0.355	0.289	1.29	0.217	181.97	42.44	17.32	28.83
S.E.±	0.02	0.007	0.003	0.002	0.01	0.002	1.56	0.46	0.12	0.26
C.D. (P=0.05)	0.06	0.019	0.008	0.007	NS	0.005	4.42	1.31	0.35	0.74
Clay loam	2.29	0.795	0.362	0.264	1.30	0.219	182.10	42.56	17.54	29.72
Loamy sand	2.09	0.653	0.367	0.245	1.25	0.202	180.03	40.87	15.50	26.78
S.E.±	0.02	0.006	0.002	0.002	0.01	0.001	1.28	0.38	0.10	0.21
C.D. (P=0.05)	0.05	0.016	0.007	0.005	NS	0.004	3.61	1.07	0.27	0.60

NS= Non-signficant

Table 6 : Effect of Mg sources on dry matter yield and nutrients content in maize varieties

Varieties	DM (g/pot)	Nutrient content (%)					Nutrient content (mg/kg)			
		Ca	Mg	P	K	S	Fe	Mn	Cu	Zn
Navjot	1.17	0.788	0.336	0.261	1.31	0.211	187.30	46.46	19.59	32.61
PEHM-2	1.41	0.798	0.367	0.259	1.30	0.219	187.30	46.18	19.33	32.42
Aravali M-1	1.37	0.648	0.416	0.258	1.29	0.221	186.71	45.89	19.01	32.14
Pratap M-5	1.83	0.672	0.339	0.252	1.28	0.214	186.41	45.61	18.77	31.88
Pratap M-3	1.68	0.641	0.334	0.248	1.27	0.223	186.11	45.35	18.49	31.59
S.E.±	0.02	0.008	0.005	0.002	0.01	0.003	1.80	0.71	0.19	0.33
C.D. (P=0.05)	0.05	0.023	0.014	0.007	NS	0.008	5.08	2.00	0.55	0.93
Control	1.34	0.644	0.317	0.253	1.27	0.212	185.90	44.82	18.23	31.38
Dolomite	1.51	0.782	0.362	0.225	1.29	0.218	186.69	46.08	19.02	32.06
$MgSO_4$	1.62	0.703	0.396	0.259	1.30	0.223	187.55	46.80	19.87	32.94
S.E.±	0.01	0.006	0.004	0.002	0.01	0.002	1.39	0.55	0.15	0.26
C.D. (P=0.05)	0.03	0.018	0.011	NS	NS	0.006	3.93	1.55	0.45	0.72
Clay loam	1.62	0.751	0.387	0.265	1.31	0.227	187.81	46.85	19.31	32.48
Loamy sand	1.36	0.668	0.329	0.246	1.27	0.208	185.62	44.95	18.76	31.77
S.E.±	0.01	0.05	0.003	0.002	0.01	0.002	1.34	0.45	0.12	0.21
C.D. (P=0.05)	0.03	0.015	0.009	0.004	0.03	0.005	2.21	1.26	0.35	0.59

NS= Non-significant

Results shows (Table 1, 2 and 3) that significantly higher Ca Mg available phosphorus potassium sulphur Fe, Cu and Zn content was recorded in clay loam soils than loamy sand soil. The higher nutrient content was observed in clay loam soil because of the dominance of clay minerals and finances of the particle, the clay loam soil retained and adsorbed more cations than sandy loam soils (Singh and Narain, 1979).

Dry matter yield:

The significantly higher dry matter yield was Produced by veriety Lok-1(3.18 g/pot) of wheat, RD-2645 (2.67 g/pot) of barley and Pratap M-5 (8.24 g/pot) of maize, followed by varieties GW-322(3.07 g/pot) of wheat, RD-2592 (2.52 g/pot) of barley and Navjot (7.96 g/pot) of maize crops. The lowest dry matter was produced by varieties Raj-4037 in wheat, RD-2552 in barley and Pratap M-3 in maize (Table 4).

Among the magnesium sources more dry matter yield was recorded with magnesium sulphate application in wheat, barley and maize crops (2.94, 4.35 and 7.28 %, respectively) over dolomite. However, dolomite was also superior over control whereas, the dry matter yield of wheat, barley and maize were 5.78, 5.99 and 12.69 per cent more than control. It is clearly indicated that the application of magnesium sources (magnesium sulphate 30 kh/ha and dolomite 30 kg/ha) produced significantly higher dry matter than control. Similar finding was observed in wheat by (Desh Bandhu *et al*.,2003). The increase of dry matter yield because of magnesium might be attributed to low availability in experimental soils which responded to the magnesium sulphate. Thus, is obvious the magnitude to response of magnesium was higher in case of wheat, barley and maize crops. Magnesium is the chief constituent of chlorophyll which resulted in formation of carbohydrate in the leaves and thereby ultimately enhancing the yield. (Singh and Pathak, 2002) reported a significant response of crops to magnesium.

Further data revealed that the significantly increased dry matter yield (5.22%, 9.60% and 19.11% in wheat, barley and maize crops, respectively) in clay loam grown soil than loamy sand soil (Table 4, 5 and 6). Clay loam soil has higher fertility status as compared to sandy loam soil and thus might have led to greater root proliferation in soil.

Plant nutrient content :

Nutrient content of wheat varieties (Table 4) show that highest magnesium, iron, manganese, copper and zinc content were observed in variety Lok-1 while, highest calcium content was found in variety HI-8498 and sulphate in variety Raj.3756, respectively. In barley (Table 5) sulphur content was found more in barley varieties RD-2624 and magnesium, iron, manganese, copper and zinc content obtained in variety RD-2592. The highest calcium was found in variety RD-2552, however, potassium and phosphorus content did not vary significantly. Highest value (Table 6) of calcium, magnesium and sulphur content was found in maize varieties PHEM-2, Aravali Makka-1 and Pratap Makka-3, respectively, while, highest phosphorus, iron, manganese, copper and zinc content was found in variety Navjot.

Data (Table 4, 5 and 6) showed that increase of nutrient content in plant owing to application of magnesium sulphate and dolomite. The per cent content of magnesium, sulphate, iron, manganese, copper and zinc in wheat plant (44.84, 5.31, 1.30, 3.11, 7.24 and 5.47 per cent, respectively), in barley plant (32.46, 5.85, 1.14, 3.46, 9.55 and 5.44 %, respectively), in maize plant (24.92, 5.19, 0.89, 4.42, 8.99 and 4.97%, respectively) higher over control. However, the calcium content was observed higher in wheat, barley and maize (31.20, 28.07, and 21.43 %, respectively) with application of dolomite over control. Because the dolomite contain calcium therefore soil buildup more calcium. Mg plays its role in the control and content of nutrients and its role as activator for many enzymatic processes in the plant tissues (Marschner, 1995). Similarly result also reported by (Basak and Dravid, 1997).

Conclusion :

The paper was aimed to determine the effect of magnesium sources on nutrient contents under different wheat and barley varieties grown soil. The results are also summarized in this paper which clearly depict that highest Ca content in soil was observed in pot of variety GW-322 while, highest Mg, Fe, Mn, Cu and Zn content was observed in pot of variety Lok-1 and available sulphur was recorded in pot of variety HI-8498. In barely the higher Ca content in soil was observed in variety RD-2035. Highest Ca content was found under application of dolomite while, the highest Mg P, S, Fe, Mn, Cu and Zn content estimated with magnesium sulphate application soils. Further, data revealed that the clay loam soil hold more nutrients than loamy sand soil.

The shoot tissue of wheat variety Lok-1, maize variety Navjot and barley variety RD-2592 have higher concentration of maximum numbers of nutrients. Ca content was observed significantly higher with application of dolomite grown crops dry matter.

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