

Quality Properties of Wheat as Affected by Micro Nutrients and Culture Practices

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ABSTRACT:

The term quality of wheat generally refers to its suitability for a particular end use. There are many factors which affect the quality parameters like cultural practices, micronutrients, growth regulators, plant diseases and insects, genetic and environment factors.

EFFECTS OF MICRONUTRIENTS:

There are few micronutrients such as zinc and iron play an important role in the plant metabolism which may results a good crop with improved quality.

Zinc is closely involved in the N metabolism of the plant and its deficiency cause a sharp decrease in the level of RNA and the ribosome content of cells. This reduction in RNA synthesis leads to an inhibition of protein formation whilst glucose, non protein N and DNA are relatively increased. Zinc is required in the synthesis of tryptophan. Zinc has a possible role in plant metabolism involved in plant metabolism in starch formation and it found that the starch content, the activity of enzyme starch synthesize and the number of starch grains were all more depressed in the susceptible cultivar.

The most well known functioning of Fe is in enzyme system, in which heam or heamin function as prosthetic group. The heam enzyme systems include catalaze, peroxidase, cytochrome oxidase as well as various cytochromes. The precise role of these enzymes in plant metabolism is still not understood. Much more is known of the function of cytochrome in electron transport and involvement of cytochrome oxidase in the terminal step in the respiration chain. When Fe is deficient there is a reduction in the activity of all these enzymes.

In green plant there is often good correlation between the level of Fe supply and the chlorophyll content, plant well supplied with Fe being high in chlorophyll. The possible involvement of Fe in protein metabolism has also been observed that in Fe deficiency the protein fraction decreases simultaneously with an increase an the level of soluble organic N compounds. Fe is directly implicated in nucleic acid metabolism.

Table-1.Effect of Zinc in different quality parameters of wheat

Quality Parameters	Zn0	Zn1	Zn2	CD at 5%
Test weight (g)	42.29	41.49	43.07	1.09
Grain Hardness (kg)	10.60	11.30	11.50	NS
Protein (%)	12.80	13.71	14.16	0.16
Gluten (%)	10.63	11.45	11.93	0.22

Total Carbohydrate (%)	66.70	67.96	70.00	1.26
Lysine (g / 16 gN)	2.66	2.57	2.51	0.02
Sedimentation value (ml)	36.33	38.56	39.85	1.57
Pelshenke value (min)	163.55	168.26	171.85	4.52
Total sugar (%)	3.37	3.49	3.44	0.08
Water absorption (%)	62.56	62.96	64.04	NS

EFFECT OF CULTURAL PRACTICES ON WHEAT QUALITY:

Agronomical factors such as date of sowing, irrigation and fertilizers have been reported to have significant effects on wheat quality. Since India has been facing shortage of food grains, efforts have been directed for raising food production without paying much attention to quality. However with increase in wheat production during there is urgent need for paying attention towards the quality.

EFFECTED OF FERTILIZER APPLICATION:

Beneficial effects of nitrogen on the protein content of wheat have been reported by several workers. Since nitrogenous fertilizers have favourable effects on the grain yield, total protein yield also is markedly increased as a consequence of nitrogen application. On an average protein content increased up to 20 and 37 percent in the Indian and Mexican wheat varieties but increased protein synthesis was accompanied by a decrease in the concentration of both lysine and tryptophan.

Table-2.Effect of fertilizer on quality parameters of wheat

Quality Parameters	F0	F1	F2	CD at 5%
Test weight (g)	41.67	42.12	41.99	0.35
Grain Hardness (kg)	15.10	15.22	15.88	0.52
Protein content(%)	11.13	11.32	11.72	0.05
Gluten (%)	9.07	9.19	9.61	0.04
Lysine g/100g protein	2.81	2.77	2.69	0.009
Sedimentation value (ml)	43.52	45.46	44.79	0.75
Pelshenke value (min)	112.10	116.50	119.40	0.63
Total sugar (%)	3.11	3.05	3.13	0.02
Water absorption (%)	65.67	66.00	66.25	NS

EFFECT OF IRRIGATION:

Frequent irrigation were found to have an adverse effect on the protein and gluten content of wheat grain (chandani et al. 1960). Austin and Miri (1961) noted an increase in the protein content of wheat with increased moisture stress and attributed it to lower dry matter production under such conditions. Singh et al. (1971) also obtained higher grain protein with irrigation at 0.25 atmospheric tension. Austin et al. (1974) tested the physical characteristic of dough of 16 varieties under irrigation and rain fed conditions and found that the mean values for all characters except extensibility and swelling index were significantly higher in rain fed crop.

Patil and Khuspe (1978) observed that higher levels of irrigation caused slight decrease in protein content but increased the protein yield per hectare. Rao (1979) found that increased availability of moisture to wheat plant decreased the N content without affecting the P content in the grain. Protein content of grain. However,, was decreased as the irrigation frequency was increased. Kapoor and Srivastava (1980) obtained a significant increase in the protein content of wheat up to four irrigation but with six irrigation the protein content was decreased. The lysine content was significantly increased up to two irrigation beyond which it remained unchanged. Reddy (1980) obtained an inverse relationship between irrigation frequency and protein content of grain which was attributed to faster accumulation of dry matter than the uptake of nitrogen.

Table-4.Effect of irrigation on quality parameters of wheat

Quality Parameters	I0	I1	I2	CD at 5%
Test weight (g)	42.60	41.79	41.39	0.44
Grain Hardness (kg)	15.43	15.44	15.33	NS
Protein content (%)	11.51	11.27	11.38	0.06
Gluten (%)	9.48	9.22	9.18	0.03
Lysine g/100g protein	2.74	2.78	2.76	0.01
Sedimentation value (ml)	45.65	44.83	43.29	0.77
Pelshenke value (min)	114.38	115.31	118.31	0.67
Total sugar (%)	2.99	3.12	3.18	0.03
Water absorption (%)	67.58	65.25	65.08	1.04

EFFECT OF SOWING DATE:

Yadav and Srivastava, (1981) reported that most of the grain and flour characters of durum wheat were significantly affected by sowing date. Austin et al. (1968) obtained higher protein content in grain under late sowing. Atia (1972) observed that the protein content in wheat grain was increased with fort nightly delay in sowing from 10th Nov. to 10th January. However, the total yield was decreased because of reduced yield under delayed sowings.

Table-2.Effect of sowing date on quality parameters of wheat

Quality Parameters	S1	S2	S3	S4	CD at 5%
Test weight (g)	43.06	41.60	42.72	40.30	0.51
Grain Hardness (kg)	15.99	17.03	14.36	14.23	0.54
Protein (%)	10.94	11.29	11.21	12.11	0.07
Gluten (%)	8.92	9.27	9.19	9.78	0.04
Lysine g/100g protein	2.82	2.83	2.77	2.61	0.01
Sedimentation value (ml)	43.17	43.81	45.61	45.78	0.89
Pelshenke value (min)	113.94	117.89	119.28	113.89	0.77
Total sugar (%)	2.99	3.37	2.91	3.12	0.03
Water absorption (%)	66.67	66.67	65.67	66.00	NS

CONCLUSION:

Application of nitrogen has invariably resulted in increasing the protein content of grain as well as total protein yield. The gluten content was also increased by nitrogen application where as the lysine content of grain protein showed a decrease. The total lysine production was invariably increased by nitrogen application. Nitrogen application had favorable effect on some amino acids like glutamic, alanine, valine, leucine and phenylalanine but reduced the content of lysine and a few other amino acids. Pelshenke value and water absorption by dough are also increased by nitrogen application. Protein content of wheat grain is generally reduced by irrigation; protein content of wheat grain is usually higher under late sowing.

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