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NUTRIENT ACCUMULATION PATTERN IN HULLED AND HULL-LESS BARLEY

NAHAB[1] and K.N. SINGH[2]

Field experiments conducted during 1979-80 and 1980-81 at Indian Agricultural Research Institute, New Delhi to study the nutrient accumulation pattern in two barley types (DL-85 hulled and IB-65 hull less) revealed that nutrient accumulation was more at initial stages of crop growth and it declined with the age of the crop. At harvest, the nitrogen and phosphorus content in the grain showed an increasing trend, while a decreasing trend was observed in case of straw. The reverse was true in case of potassium content. Hull-less barley recorded higher nitrogen, phosphorus and potassium content than hulled barley.

The grain yield of cereal crops is function of interaction between climatic. soil, plant and management factors. Nitrogen being one of the essential nutrient elements, affects the growth of barley and ultimately the yield. In general, the nitrogen accumulation occurs in the crop plant before flowering and later on translocated to the inflorescence (Williams, 1955). This process occurs mostly when most of the nitrogen has been applied at the time of sowing. As the plant age increases, the nitrogen absorbed is translocated to the upper parts of the plants and hence the content of nitrogen in lower parts is decreased. Phosphorus and potassium are less mobile in comparison to nitrogen and hence the decrease in phosphorus and potassium is less in comparison to nitrogen in the lower parts of the plants.

MATERIAL AND METHODS

Field experiments were conducted in 1979-80 and 1980-81 at Indian Agricultural Research Institute, New Delhi to study the nutrient accoumulation pattern in two bariey types *viz.* DL-18 (oulled) and IB-65 (hull-less) tested in a randomised block design. The soil of the experimental area was loamy sand having a medium fertility status. The crop was fertilized with 40 kg N/ha and 20 kg/ha each of P_2O_5 and K_2O applid at the time of sowing. The total nitrogen was estimated by modified Kjeldahl method (Jackson, 1967). Phosphorus was determined by Vanadomolybdate-phosporic yellow colour method, using absorption photometer (A O. A. C., 1955) and potassium by Flame photometer method (Jackson 1967).

RESULTS AND DISCUSSION

The data on nutrients accumlation in the whole plant at active tillering, flag leaf. milk, grain filling and at harvest stages as affected by varieties are summarised in Table 1.

Nitrogen content.

The nitrogn content of barley plant was maximum at active tillering stage in both the seasons and thereafter it decreased till grain filling stage. At harvest, the nitrogen content in the grain showed an increasing trend while a decreasing trend was observed in case of straw.

During both the seasons, varieties did not differ in nitrogen content at

1. Assistant Professor of Agronomy, Tamil Nadu Agricultural University, Coimbatore-641 003.
2. Senior Scientist (S 3), Division of Agronomy Indian Agricultural Research Institute. New Delhi-110 012.

active tillering stage. At flag leaf stage, hull - less barley had significantly more nitrogen content than hulled barley in both the years. However, at milk stage both the varieties did not differ much in nitrogen content in 1979-80, while in 1980-81 hull-less berley had significantly more nitrogen content than hulled barley. At grain filling stage there was no difference in nitrogen content of both the varieties in both the years At harvest stage hull-less barley accumulated significantly higher percentage of nitrogen than hulled barley in both the seasons.

In general, the nitrogen content of both varieties of barley gradually decreased as the growth of barley advanced. Luebs and Laag (1969) and Misra (1978) have also observed that nitrogen content of barley decreased as the season progressed which could be ascribed the dilution that occurred due to excessive production of dry matter in the later stages of crop growth.

Phosphorus content.

Phosphorus content in barley varieties did not differ at active tillering and flag leaf stages in 1979-80, while in 1980-81, no significant difference was observed till grain filling stage. At milk and grain filling stages, a sigficant difference in phosphorus content was observed during 1979 80, where hull less barley had higher percentage of phosphorus than hulled barley. At harvest, the two varieties did uot differ in phosphorus content of grain but in straw they showed significant difference Hull-less barley had greater phosphorus accumulation in straw over hulled barley in 1979-80, In 1980-81 the hull-less variety had a gteater phosphorus content in both grain and straw. This might be due to faster rate of absorption and translocation to various plant parts by hull-less barley as compared to hulled barley. thereby accumulating more phosphors in plant body.

Potassium content.

The potassium content at active tillering stage did not differ due to varieties during both the seasons In 1979-80, the hull less variety had significantly higher potassium content than hulled variety at flag leaf, milk and at harvest stages. In 1980-81, except at active tillering stage, hull-less barley recorded higher potassium content than hulled barley at all other stage. This might be a genotypic character of hull less barley which might have absorbed and translocated more potassium than hulled barley.

In general, the nitrogen, phosphorus and potassicm content of hulled and hull-less barley varieties was higher at initial stages of growth and it declined with the age of the crop. At harvest, the nitrogen and phosphorus content in the grain, showed an increasing trend while a decreasing trend was observed in case of straw. The reverse trend was observed in case of potassium content. Hull-less barley recorded higher nitrogen, phosphorus and potassium content than hulled barley.

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Table 1. Nutrient accumulation pattern in hulled and hull-less barley

Crop Stage	Nitrogen(%)				Phosphorus(%)				Potassium(%)			
	Hulled	Hull-less	S.E.	CD (5%)	Hulled	Hull-less	S. E.	CD(5%)	Hulled	Hull-less	CD	5%
					1979-'80							
Active tillering	2.34	2.36	0.02	NS	0.464	0.460	0.009	NS	2.38	2.36	0.03	NS
Flag leaf	1.06	1.18	0.62	0.06	0.513	0.521	0.014	NS	2.13	2.26	0.02	0.06
Milk	0.76	0.82	0.03	NS	0.388	0.474	0.010	0.029	1.26	1.98	0.05	0.15
Grain filling	0.53	0.56	0.02	NS	0.300	0.386	0.014	0.040	1.40	1.49	0.04	NS
Harvest (grain)	1.23	1.38	0.01	0.04	0.462	0.497	0.017	NS	0.52	0.67	0.02	0.05
Harvest (straw)	0.38	0.38	0.01	NS	0.108	0.202	0.009	0.026	1.29	1.77	0.04	0.12
					1980-'81							
Active tillering	2.56	2.58	0.04	NS	0.466	0.461	0.006	NS	2.33	2.35	0.02	NS
Flage leaf	1.26	1.30	0.02	0.04	0.498	0.511	0.010	NS	2.12	2.22	1.02	0.06
Milk	0.73	0.88	0.02	0.05	0.465	0.483	0.007	NS	1.21	1.61	0.03	0.08
Grain filling	0.56	0.59	0.01	NS	0.350	0.362	0.006	NS	1.15	1.36	0.02	0.06
Harvest (grain)	1.24	1.39	0.02	0.05	0.459	0.495	0.008	0.023	0.42	0.49	0.01	0.02
Harvest (straw)	0.41	0.43	0.01	NS	0.121	0.171	0.006	0.017	1.11	1.32	0.01	1.04

NS - Non Significant