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UTILIZATION OF N BY WHEAT FROM NH_4 AND NO_3 FORMS APPLIED AS NH_4NO_3 SELECTIVELY LABELLED WITH N^{15}

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Uptake of NH_4 and NO_3 ions by plants has been studied extensively. [1-3] When nitrification inhibitor was used to differentiate between the ions being absorbed by wheat NH_4-N promoted more leaf and stem growth than NO_3-N during early stages but the grain yield was unaffected by the form of N. [3-5] The economics of fertilizer use requires an assessment of the utilization of N from various sources. Isotopically labelled fertilizer materials provide a unique tool for such investigations. Fried and Dean[6] suggested an A value concept for measuring the amount of nutrient in a source in terms of a standard source of that nutrient. It is based on the assumption that when a plant has access to two sources of N with no interaction between the sources, the plant will absorb N from the two sources in direct proportion to the respective amounts available.

The objective of this study was to determine the utilization of N from NH_4 and NO_3 in wheat from NH_4NO_3 selectively labelled with N^{15} and applied at seeding and at tillering stage.

Materials and Methods

A field experiment was done on sandy clay-loam soil having pH 8.5, total N 0.03% and available P (Olson) 10 p.p.m. Fertilizer treatments were arragnged in a randomized block design with eight replicates. The individual plot was 1×5 m with five rows of wheat plants. Ammonium nitrate was given in two doses of 60 kg N/ha each applied at seeding and tillering stage. Each plot received only one dose of N from selectively labelled NH_4NO_3 ($N^{15}H_4NO_3$ or $NH_4N^{15}O_3$ with 1% N^{15} enrichment) either at seeding or at tillering. Superphosphate was applied at 30 kg P/ha at seeding. At seeding both NH_4NO_3 and superphosphate fertilizers were applied in a band 5 cm to the side and 2 cm below the seed row. At tillering stage NH_4NO_3 was broadcast uniformly on the soil. The crop received normal irrigation.

Grain and straw samples were collected at maturity, dried at 70°C, ground and analysed for N content by Kjeldahl method. The N^{15} analysis was done by the staff at Sheibersdorf Laboratories of IAEA.

The efficiency of uptake of NH_4-N and NO_3-N was evaluated by A value data calculated from N^{15} analysis of the grain and based on the for mula.[6]

$$A = B \quad (1 - Y/Y)$$

where A (A value) is the amount of soil N measured in units of applied fertilizer standard; B is the amount of labelled standard N fertilizer applied; and Y is the fraction of the N in the plant derived from the labelled standard N fertilizer (1-Y, thereby the fraction from the soil).

An analysis of variance was made and L.S.D. worked out to test the significance of differences between means.

Results and Discussion

The results showed that the time of application of N had a significant effect on uptake of fertilizer N in wheat grain. The utilization of both NH_4-N and NO_3-N from NH_4NO_3 applied at tillering stage was greater than that from the dose applied at seeding (Table 1). This indicates that tillering is the critical stage of wheat for the application of N and at this stage N is most efficiently utilized under conditions prevailing in Pakistan. Lower recovery of N applied

Table 1. Effect of NH_4NO_3 on Yield, N Uptake, % N Derived from Fertilizer, Utilization of Fertilizer N and 'A' Value in Wheat.

Stage of N application kg N/ha		Yield kg/ha		Total N uptake kg/ha		% N derived from fertilizer		Fertilizer N uptake kg/ha		Utilization of fert. N %		A value kg/ha
(Seeding	Tillering)	(Grain	Straw)	(Grain	Straw)	(Grain	Straw)	(Grain	Straw)	(Grain	Straw)	(Grain)
$N^{15}H_4NO_3$												
60*	60	4704	8264	88.9	27.6	9.4	8.6	8.4	2.8	28.0	8.0	289
60	60*	4598	8074	87.4	25.3	14.0	14.1	12.4	3.9	41.3	13.0	184
$NH_4N^{15}O_3$												
60*	60	4604	8097	87.0	24.7	11.6	13.4	10.3	3.3	34.0	11.0	226
60	60*	4699	8108	88.2	26.1	17.9	18.4	15.7	4.5	52.3	15.0	137
L.S.D.	P=0.05	NS	NS	NS	NS	6.2	7.0	2.44	NS	6.00	NS	47
	P=0.01					8.2	9.1	3.55		11.06		70

*Fertilizer labelled with N^{15}. NS nonsignificant.

at seeding may be because a part of N was leached down and distributed in deeper layers and wheat seedlings with less developed root system were unable to absorb N from soil layers beyond the root system. The comparison of utilization of N in wheat grain from NH_4 and NO_3 forms showed that wheat plants absorbed 21.4 and 26.6% higher N from NO_3 than from NH_4 form from NH_4NO_3 carrier applied at seeding and tillering stage, respectively ($P=0.05$). Similarly per cent utilization of N in straw from NO_3 form was greater than from NH_4 form. Other criterion used for assessing the efficiency of fertilizer N like A value also indicated that NO_3 form of N was significantly superior to NH_1 form for wheat. Lower A value is an indicator of higher utilization of applied fertilizer by the plants. The smaller recovery of N from NH_4 than from NO_3 may be because a sizeable part of NH_4 was lost through volatilization under alkaline soil conditions and chemical immobilization of NH_4 in the soil.[8,9]

The results of this study are in agreement with those of Spratt and Gasses[10] who reported that wheat plants given NO_3 contained significantly more N than those given NH_4 when watered adequately. The results obtained in this study and those reported earlier[7] suggest that NO_3 source of N would be a better carrier for irrigated wheat under Pakistan conditions.

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APPEARANCE OF A POTENTIAL PEST OF RICE, PODOPS LIMOSA WALKER (PENTATOMIDAE: PODOPINI) THE STINK BUG OF PADDY, IN THE RICE FIELDS OF SUJAWAL, THATTA DISTRICT OF LOWER SIND, PAKISTAN*

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Podops limosa Walk. the stink bug of paddy, is closely allied to *Scotinophara coarctata* (Fabr.) which has been reported as major pest of rice in the Salem district of former British India,[2] Malaysia,[1] Sarwak[4] and Thailand.

During a recent survey of the insect pests of paddy throughout southern Sind, *P. limosa* has only been found in paddy fields of Sujawal in annoying numbers. (Actual population studies are still being carried out and will be reported on separately.)

The stink bug invades only those fields which have no standing water and sucks the sap from paddy stem, as a result of which panicles fail to develop, the leaves turn reddish brown and sometimes the whole plant is stunted. All developmental stages of the bug devour on the paddy plant.

If an infested field is flooded both nymphs and adults escape to adjacent sedges and grasses, some of which probably serve as alternate host.

At this stage it has been observed that drying up of a paddy fiield may invite these bugs in large numbers even a few days before harvest.

As regards the taxonomic position of the bugs it could be tentatively suggested that a complex of species are involved. Detailed systematic and biological studies are already in progress which will further throw light on the present complex.

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A NEW SPECIES OF AMBLYTHYREUS WESTWOOD (HETEROPTERA, REDUVOI DEA, PHYMATIDATE) FROM PAKISTAN

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Oriental phymatid fauna is rich yet unexplored, although it is an important group of predatory insects.

Uhler [2] found some species on the stems and flowers of Euphorbiacae and Compositae praying upon visiting bees and other insects.

Distant[1] described six species of *Amblythyreus* from Assam, Burma and Bengal, mostly on colouration, ratio of the length of antennal segments, length and width of pronotum and scutellum.

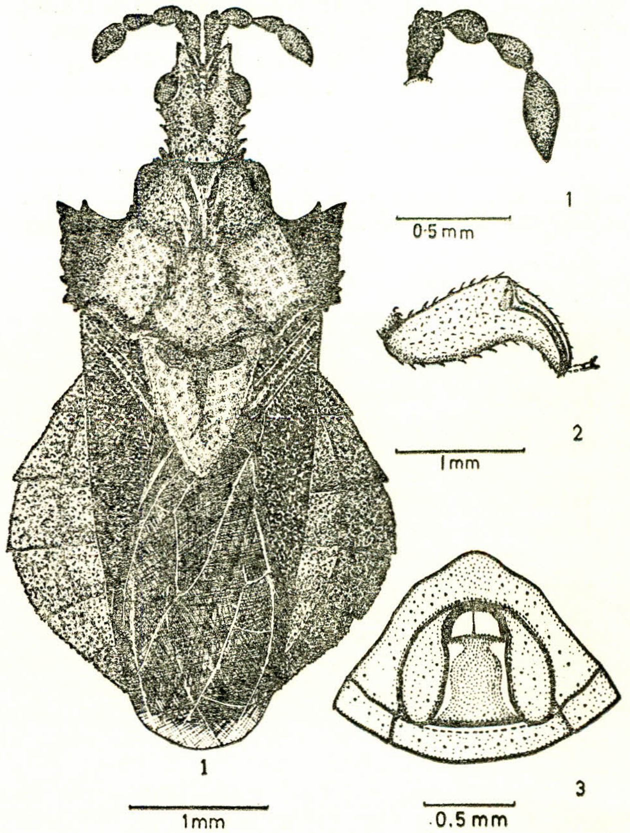
The described unique female specimen has bizarre rows of spines on the median portion of the pronotum, three of these located in front of depressed line demarcating anterior half from posterior half and remarkably raised outer margins of the latter as well as several prominent characters noted in the description. The above characters distinguish this specimen as a new species *A. murreeana*.

Amblythyreus murreeana **n.sp.** (Figs. 1-3)

Body ovate, tylus, jugae, vertex, antennal segments, pronotum (except ridge), scutellum, abdominal sternites, labial segments and legs brown. Connexiva, wing membrane and eyes ochraceous, ocelli bright red.

Head short, but distinctly longer than broad, with anterior notch, densely granulated, posterior portion (including eyes) more than three times as wide as anterior portion of head (excluding eyes), with three pairs of lateral spines. Jugae not meeting, pointed at the apices with a pair of spines, anteriorly produced with deep median notch, tylus much smaller than jugae, eyes very slightly convex, inserted in anterior half of the head. Ocelli on mounts facing each other, located in the centre, lateral margins of posterior portion of head with three pairs of spines evenly spaced, antenniferous tubercles withholding lateral half of basal antennal segments, latter incrassated and granulated, apical segments leaf-shaped (Fig. 1a), labium reaching anterior coxae with II, III and IV segments almost equal in length, length of head, 0.433 mm; length of anterior portion (excluding eyes), 0.1 mm.; of posterior portion (including eyes) 0.333 mm; width, 0.333 mm; interocular distance, 0.3 mm; interocellar distance, 0.2 mm; length of antennal segments I, 0.1 mm; II, 0.64 mm; III, 0.066 mm. Pronotum distinctly broader than long, strongly narrowing, anterior margin four times narrower than width across posterior margin, former shorter than width of head across eyes, deeply concave forming socket for posterior portion of head, surface of anterior half densely granulated, lateral margins slightly dentate, posterior half densely punctate, dumble-shaped, lateral margins sinuate, humeral angles acute, distinctly elevated, posterior margin sinuate, five pairs of spines arising from a central ridge, located anterior to a depressed line,demaracating anterior and posterior half, fifth pair larger and located more anteriorly, spines subequal in length, tooth-shaped, width of pronotum, 1.5 mm.; length 1.0 mm.

Scutellum short, heart-shaped, attaining fourth abdominal segment, punctate, pointed apically, slightly raised area at the base continued medially, bodered with yellow granules, length, 0.7 mm.; width, 0.7 mm.;



Figs. 1-3

distnace apex scutellum apex abdomen, 1.5 mm. Metathoracic scent gland ostioles, slit-like, peritremes fully developed, spout-like with spices broadly rounded and projecting postero-laterad, reaching outer limit of the evaporatoria, latter prominent and rugulose.

Membrane of hemelytra extended beyond apex of adbomen, with simple longitudinal veins, clavus and corium exposed, abdomen much expanded laterally and flattened, longer than broad, connexiva completely exposed, sternites medially projected anteriad fitting into concavity on posterior margin of segment III and VI.

Forelegs modified for predalion with femur flattened, broad, distal margin grooved, to receive small curved toothed tibia (Fig. 2).

Posterior margin of seventh abdominal sternum concave, eighth paratergites greatly developed, lobe-like with acute apices, base broad, extending much beyond rather smaller ninth paratergites, first gonocoxae much reduced, telescoped within eighth paratergites, proctiger U-shaped, enlarged (Fig. 3).

Comparison. *Amblythyreus murreeana* new specie is closely related to *A. gestroi* but can easily be separated from the latter by the acute and elevated humeral angles of pronotum with five pairs of spines arising from a ridge in the middle of pronotum, three of these located in front of a depressed line demarcating the anterior from the posterior half. In the new species, on the base of scutellum there is a slightly elevated area which is continued medially but is absent in *A. gestroi*. The latter has a small spot at each basal angle of the scutellum, being absent in *A. murreeana* new species.

Material Examined. Holotype, female, Pakistan: Punjab, Murree Hills (Sandian village), on *Rumcx hastatus* leg. Azhar A. Khan, 25 may 1971, lodged at Natural History Museum, Department of Zoology, University of Karachi.

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