Materials and Methods

Description of the study area

T e experiment was conducted in Afar Regional state at Zone three, Amibara district, in Werer Agricultural Research Center (WARC) during o f season in 2015-2016 located at 278 km east of Addis Ababa

and total nitrogen content of the soil, before planting were found to be 2.22% and 0.17%, respectively, which according to Charman et al. can be described as low in nitrogen and OM. T e carbon to nitrogen ratio (C/N ratio) value was 7.7, which signify a relatively high rate of mineralization and low rate of N immobilization [25].

T e laboratory analysis results of diferent physicochemical properties of soil, afer harvesting shows particle size distribution of the surface layers of the experimental feld was dominated by sand (53.9%), clay fraction (30.4%) and 19% silt; and categorized as sand clay loam.

T e proportion of soil particle size afer harvesting wheat difer from before sowing, clay particle increase from 26.4 to 30.4%, while sand soil had little change 53.6 to 53.9% afer harvesting wheat, and silt fraction of the soil decreased (Table 1). Similar to soil analysis before sowing, the average of electrical conductivity (EC) of soil afer harvesting was also 7.3 ds/m which shows that the soil is saline.

T e average soil pH afer harvesting was [illegible]

obtained with the treatment of 92 kg/ha N and 75 kg/ha seed rates; and with control treatment of N and 150 kg/ha seed rate, respectively (Table 4).

T e percentage of N in the straw and grain increased in line with the increase in grain yield, which means that more N was required per

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Interaction effect of N and seed rates on nitrogen use efficiency and apparent nitrogen recovery

The interaction of N and seed rates significantly ($p<0.05$) affect nitrogen use efficiency (NUE), and apparent nitrogen recovery (ANR) (Table 6). The lowest (28.27) and highest (98.79) NUE obtained with the treatment of 23 kgN/ha and 125 kg/ha; and 92 kgN/ha and 150 kg/ha seed rate, respectively (Table 6). According to Gaju et al. wheat with 18-38 NUE is considered high, while low at 41-101 NUE [29]. Lopez-Bellido indicated that decreased in NUE with increasing fertilizer rates is because grain yield rises less than the N supply in soil and fertilizer [30]. Similarly, ANR decreased with increasing N rate (Table 6). The highest ANR (224.17%), was recorded with the treatment of 23 kgN/ha and 75 kg/ha seed rate, while the lowest (78.5%) is recorded on treatment 92 kgN/ha with 150 kg/ha seed rate (Table 6).

Seed rate (kg/ha)	**Applied N rate (kg/ha)**											
	0	**23**	**46**	**69**	**92**	**Mean**	**0**	**23**	**46**	**69**	**92**	**Mean**
	Nitrogen Use Efficiency						**Apparent Nitrogen Recovery (%)**					
75	-	82.16^{a-c}	64.05^{a-c}	52.65^{a-c}	37.17^{a-c}	59	-	224.17^{a}	127.63^{ba}	106.87^{ba}	82.53^{ba}	122.2
100	-	70.75^{a-c}	62.00^{a-c}	50.44^{a-c}	34.07^{a-c}	54.3	-	166.5^{ba}	126.03^{ba}	104.37^{ba}	81.73^{ba}	108.3
125	-	98.79^{a}	54.66^{a-c}	44.84^{a-c}	31.26^{a-c}	57.4	-	160.6^{ba}	123.3^{ba}	90.4^{ba}	81.40^{ba}	103.3
150	-	87.37^{a}	53.20^{a-c}	38.21^{a-c}	28.27^{bc}	51.8	-	158.03^{ba}	112.23^{ba}	85.83^{ba}	78.50^{ba}	90.6
Mean	-	84.8	58.5	46.5	32.7	--	-	177.3	122.3	96.9	81	--
SE (±)	3.0						1.6					
CV (%)	11.0						5.0					

Means followed by the same letters are not significantly different at $p<0.05$.