

## CENTRAL OAT OS 403 – A NEW SINGLE-CUT FORAGE OAT VARIETY FOR NORTH EAST, SOUTH AND NORTH WEST ZONES OF INDIA

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### SUMMARY

An improved single-cut fodder oat variety, “Central Oats OS 403” was developed by pedigree method of breeding by Forage Section, Department of Genetics & Plant Breeding, CCS Haryana Agricultural University, Hisar. Identified under AICRP on Forage Crops & Utilization, released and notified for cultivation under timely sown, normal fertility and irrigated conditions in the North West Zone of India (Haryana, Punjab, Uttrakhand and Rajasthan); North East (Assam, Manipur, Odhisha, West Bengal, Eastern UP, Bihar, Jharkhand) and South zone (Telengana, Andhra Pradesh, Karnataka and Tamil Nadu). In the NWZ “CENTRAL OAT OS 403” provides 534 q/ha of green fodder. It gave 10.0-12.0% more green fodder yield than the national checks Kent and OS 6 in different zones. It gives high dry matter of 108 q/ha. It also has better nutritional qualities. It is moderately resistant to leaf blight disease, bold seeded and is capable of giving 18-20q/ha of seed.

**Key words :** Single-cut oat variety, OS 403, green fodder yield, dry matter yield

Livestock production is backbone of Indian agriculture contributing 4% to national GDP and source of employment and ultimate livelihood for 70% population in rural areas. India with 2.3% share of global geographical area supports nearly 20% of the livestock population of the World. Its livestock sector is one of the largest in the world. It has 56.7% of world's buffaloes, 12.5% cattle, 20.4% small ruminants, 2.4% camel, 1.4% equine, 1.5% pigs and 3.1% poultry. The desired annual growth of agriculture sector @ 4% can also be accomplished by enhancing productivity from the livestock sector. This would require a steady supply of fodder for supporting the livestock population. Having only 4% of total cropping area under fodder cultivation will result in a severe deficit of green fodder (31%), dry fodder (12%) by 2020. The single most important constraint in the fodder production and productivity is the non-availability of quality improved varieties of forage crops to the farmers. The supply of nutritious fodder is a pre-requisite for the success of dairy industry. Oat is a nutritive forage, palatable having good regeneration capability with high dry matter production (Kumar *et al.*, 2010). As area for fodder production is decreasing continuously, therefore, for higher fodder

production, there is only way to develop the high yielding varieties of fodder crops.

The improved single-cut oat variety, Central Oat OS 403, was developed under AICRP (Forage Crops & Utilization) and released and notified vide Gazette Notification Ministry of Agriculture and Farmers Welfare under Department of Agriculture, Cooperation and Farmers Welfare, GOI, New Delhi, vide S.O. 1379 (E), 27.3.2018 for cultivation under timely sown, normal fertility and irrigated conditions **North West Zone** (NWZ) of India (Haryana, Punjab, Uttrakhand and Rajasthan); **North East** (NEZ) (Assam, Manipur, Odhisha, West Bengal, Eastern UP, Bihar, Jharkhand) and **South zone** (SZ) (Telengana, Andhra Pradesh, Karnataka and Tamil Nadu). The new variety was registered with NBPGR having IC No. 615012. The new variety OS 403 was developed at Forage Research Section, Department of Genetics & Plant Breeding, CCS Haryana Agricultural University, Hisar by pedigree method of breeding.

Green Fodder Yield of this variety in NEZ & SZ was observed at 54.3 q/ha which is about 11% and 13% more than the national checks Kent (409.3 q/ha) and OS 6 (402.5 q/ha), respectively Table 1(A). It showed superiority of 20% & 63% green fodder yield

than the zonal checks JHO 99-2 (NEZ) and JHO 2000-4 (SZ), respectively. In NWZ, it gave 533.8 q/ha green fodder yield which is 17.8% and 14.1% more than the national checks Kent (453.7 q/ha) and OS 6 (468.4 q/ha), respectively. It showed superiority of 15% for green fodder yield than the North West Zone check OL 125 (465.1 q/ha) Table 1(B). Dry Matter Yield of this variety in NEZ & SZ (96.2 q/ha) out yielded the best national checks Kent (87.2q/ha) by 10% for dry matter yield. It showed superiority of 28% & 68% dry fodder yield than the zonal checks JHO – 99-2 (NEZ) and JHO 2000-4 (SZ), respectively Table 2(A). In NWZ: Variety OS 403 (108.1 q/ha) out yielded the best national checks Kent (92.0q/ha) by 18.2% and OS 6 (92.9 q/ha) by 17.4% for dry matter yield. It showed superiority of 26.9% for dry matter yield than the North West Zone check OL 125 (86.8 q/ha) Table 2(B).

This variety gave 2.3% higher per day productivity of GFY over best national check Kent in NEZ & SZ, While it gave 19.7% higher GFY per day productivity over the best qualifying variety UPO 06-1. It also showed its superiority for higher per day productivity of DMY over the national checks Kent (3.4 %) and OS 6 (6.8 %) and a 10.8 % gain over the best qualifying variety UPO 06-1. The variety OS 403 also gave 17 % higher per day productivity of GFY over best national check Kent in NWZ, while it gave 24.45% higher GFY per day productivity over the North West Zone check OL 125. It also showed its superiority for higher per day productivity of DMY over the national checks Kent (8.6 %) and OS 6 (10.0 %) and a 20.5 % gain over the North West Zone check OL 125. Its performance for Seed yield in NEZ & SZ gave a productivity of 20.5q/ha which was superior to one of the national checks OS 6 (4.59 %) but better

TABLE 1(A)  
Green fodder yield (q/ha): Mean performance of OS 403 in the North-East Zone and South Zone over three years

Year	No. of locations	Mean performance OS 403	National check		Zonal check		Qualifying varieties		
			Kent	OS 6	NEZ	SZ	UPO-06-1	NDO-711	NDO-10
					JHO-99-2	JHO-2000-4			
1st Year - 2011-12 (IVTO, SC)	27	485.4 (1)	424.3√ (11)	420.8 (12)	389.8	331.7	429.7	460.5	449.5
2nd Year -2012-13 (AVTO, SC-1)	27	442.6 (1)	399.6 (9)	403.3? (8)	380.4	251.8	412.1	432.2	410.3
3rd Year -2013-14 (AVTO, SC-2)	27	434.8 (1)	404.0√ (5)	383.3 (6)	365.9	260.7	417.3	425.9	412.0
Weighted Mean		454.3	409.3√	402.5	378.7	281.4	419.7	439.5√	423.9

√ =Indicates the best check/best qualifying variety.

Locations (10): NEZ - North East Zone (7) - Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, CAU Imphal; SZ - South Zone (3): Mandya, Hyderabad, Coimbatore

TABLE 1(B)  
Green fodder yield (q/ha) : Mean performance of OS 403 in the North-West Zone over three years

Year	No. of locations	Mean performance OS 403	National check		Zonal check (NWZ)		Qualifying varieties		
			Kent	OS 6	OL-125	NDO-711	UPO 06-1	NDO-10	
1st Year - 2011-12 (IVTO, SC)	7	563.7 (1) (22.1%)	461.5	450.4	451.5	519.6	456.6	462.2	
2nd Year -2012-13 (AVTO, SC-1)	7	567.4 (1) (16.6%)	441.5	486.6	462.4	485.9	479.6	437.2	
3rd Year -2013-14 (AVTO, SC-2)	7	470.4 (4)	458.0	468.2	481.5	452.2	485.3	499.1	
Weighted Mean		533.8	453.7	468.4√	465.1√	485.9√	473.8	466.2	

√ =Indicates the best check/ qualifying variety.

IVTO (SC) : Initial Varietal Trial in Oat (Single cut); AVTO (SC)-1: First Advanced Varietal Trial in Oat (Single cut); AVTO (SC)-2: Second Advanced Varietal Trial in Oat (Single cut)

Locations: 7 (Bikaner, Jalore, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut)

than the best national check Kent (2.5%). In NWZ, it gave a seed yield of 18.1q/ha which was at par to one of the national checks OS 6.

In Agronomy trials, the variety responded significantly up to 120 kg N/ha for GFY (420.8 q/ha) and for DMY (90.6 q/ha) at National level, whereas in NWZ, it responded significantly up to 120 kg N/ha for GFY (444.1 q/ha) and for DMY (93.1 q/ha) (Tables 3 and 4). The variety is moderately resistant to *Helminthosporium* leaf blight in all the zones. It responded significantly up to 120 kg N/ha for GFY (420.8 q/ha) and for DMY (90.6 q/ha) at National level, whereas in NWZ, it responded significantly up to 120 kg N/ha for GFY (444.1 q/ha) and for DMY (93.1 q/ha).

OS 403 is good in nutritional quality as well by showing 11.0 % superiority in protein yield over national checks Kent and OS 6 in NEZ & SZ (Table 5). It's in vitro dry matter digestibility (IVDMD %) is

at par with the national checks (Table 6). It was almost at par with the checks and qualifying varieties for ADF and NDF %. In NWZ, The variety OS 403 is showing 8.48 % crude protein. This variety is responsive to nitrogen fertilizer application as it increased crude protein percent to 10.56% at Pantnagar. However, variety OS 403 gave higher CP yield (9.3q/ha) as compared to both the national checks. It's in vitro dry matter digestibility (IVDMD %) is at par with the national checks. Sheoran *et al.* (2008) reported that increasing rates of nitrogen application up to 120 kg N/ha significantly enhanced the forage yield, crude protein and other ancillary characters over the lower doses of nitrogen at all the locations of experimentation. Kundu *et al.* (2015) reported that increasing nitrogen levels increased plant height, plant population, dry matter yield and green fodder yield. As nitrogen is the main component of plant growth and development and also increases protein content.

TABLE 2(A)  
Dry Matter yield (q/ha): Mean performance of OS 403 in the North-East Zone and South Zone over three years

Year	No. of locations	Mean performance OS 403	National check		Zonal check		Qualifying varieties		
			Kent	OS 6	NEZ	SZ	UPO-06-1	NDO-711	NDO-10
					JHO-99-2	JHO-2000-4			
1st Year - 2011-12 (IVTO, SC)	25	101.5 (1)	87.6 <sup>√</sup>	87.4	83.0	68.6	92.1	96.8	96.5
2nd Year -2012-13 (AVTO, SC-1)	27	93.1 (3)	87.7 <sup>√</sup>	87.0	71.7	49.4	94.2	94.4	91.6
3rd Year -2013-14 (AVTO, SC-2)	24	94.2 (1)	86.1 <sup>√</sup>	86.1	71.2	56.5	85.5	91.9	86.7
Weighted Mean		96.2	87.2 <sup>√</sup>	86.8	75.3	58.0	90.8	94.4 <sup>√</sup>	91.7

<sup>√</sup> =Indicates the best check/best qualifying variety.

Locations (10): NEZ - North East Zone (7) - Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, CAU Imphal; SZ - South Zone (3): Mandya, Hyderabad and Coimbatore.

TABLE 2(B)  
Dry matter yield (q/ha): Mean performance of OS 403 in the North West Zone over three years

Year	No. of locations	Mean performance OS 403	National check		Zonal check (NWZ)		Qualifying varieties		
			Kent	OS 6	OL-125	NDO-711	UPO 06-1	NDO-10	
1st Year - 2011-12 (IVTO, SC)	7	109.1 (1) (25.7%)	86.8	82.2	72.4	103.2	83.2	91.0	
2nd Year -2012-13 (AVTO, SC-1)	7	113.7 (1) (10.4%)	92.0	103.0	99.6	102.4	99.4	101.7	
3rd Year -2013-14 (AVTO, SC-2)	4*	96.6 (4)	101.0	94.1	89.8	105.6	86.0	101.6	

<sup>√</sup> =Indicates the best check/ qualifying variety \*Locations: 4 (Bikaner, Hisar, Ludhiana, Pantnagar).

IVTO (SC) : Initial Varietal Trial in Oat (Single cut); AVTO (SC)-1: First Advanced Varietal Trial in Oat (Single cut); AVTO (SC)-2: Second Advanced Varietal Trial in Oat (Single cut).

TABLE 3  
Effect of nitrogen levels on Green Fodder Yield of promising entries of Oat in South, North-West and North-East Zone

Treatment	Green Fodder Yield (q/ha)										Over all mean
	South zone			North West zone			North East zone				
	Mandya	Coimbatore	Mean	Hisar	Pantnagar	Mean	Jorhat	Ranchi	Kalyani	Mean	
<b>A. Entry</b>											
NDO-10	299.9	300.9	300.4	402.8	391.0	396.9	394.9	289.0	355.9	346.6	362.3
NDO-711	278.1	325.0	301.6	406.7	400.0	403.4	312.8	314.0	376.3	334.4	365.7
UPO-06-1	262.5	338.9	300.7	402.6	381.0	391.8	400.8	291.0	377.8	356.5	387.0
OS-403	331.6	411.1	371.4	375.2	378.0	376.6	412.3	277.0	384.8	358.0	390.1
JHO-99-2 (NEZ)	-	-	-	-	-	-	413.0	242.0	360.4	338.5	338.5
OL-125 (NWZ)	-	-	-	387.5	383.0	385.3	-	-	-	-	385.3
JHO-2000-4 (SZ)	218.3	349.1	283.7	-	-	-	-	-	-	-	283.7
OS-6 (NC)	289.5	358.3	323.9	412.9	389.0	401.0	403.3	252.0	412.2	355.8	382.8
Kent (NC)	247.7	287.1	267.4	425.5	315.0	370.3	408.3	331.0	346.3	361.9	356.8
SEm+	4.2	12.5	-	-	6.20	-	11.7	1.36	9.5	-	-
C D at 5%	12.1	38.5	-	16.7	19.0	-	34.2	3.89	29.2	-	-
<b>B. Nitrogen level (kg/ha)</b>											
40	229.6	298.0	263.8	323.6	371.0	347.3	376.7	227.0	283.2	295.6	326.1
80	276.0	340.1	308.1	395.0	386.0	390.5	392.4	271.0	383.5	349.0	375.7
120	320.5	377.8	349.2	488.2	400.0	444.1	407.4	358.0	453.5	406.3	420.8
SEm+	7.0	4.3	-	-	1.7	-	3.6	0.89	5.5	-	-
C D at 5%	21.6	12.6	-	14.5	5.0	-	10.5	2.55	16.0	-	-
<b>C. Interaction: Entry × N levels</b>											
SEm+	11.1	-	-	-	-	-	6.2	2.4	14.6	-	-
C D at 5%	NS	NS	-	-	NS	-	NS	6.8	NS	-	-
CV%	-	11.1	-	-	-	-	-	-	6.8	-	-

TABLE 4  
Effect of nitrogen levels on dry matter Yield of promising entries of Oat in South, North West and North East Zone

Treatment	Dry matter yield (q/ha)										Over all mean
	South zone			North West zone			North East zone				
	Mandya	Coimbatore	Mean	Hisar	Pantnagar	Mean	Jorhat	Ranchi	Kalyani	Mean	
<b>A. Entry</b>											
NDO-10	75.5	46.8	61.2	77.4	75.9	76.7	82.9	117.0	51.5	83.8	78.1
NDO-711	70.9	50.8	60.9	75.5	77.1	76.3	65.7	101.0	54.1	73.6	76.4
UPO-06-1	64.0	51.8	57.9	81.1	77.2	79.2	84.2	119.0	55.0	86.1	83.0
OS-403	86.6	65.4	76.0	70.9	74.1	72.5	86.6	90.0	54.3	77.0	81.8
JHO-99-2 (NEZ)	-	-	-	-	-	-	86.7	96.0	50.6	77.8	77.8
OL-125 (NWZ)	-	-	-	78.2	77.9	78.1	-	-	-	-	78.1
JHO-2000-4 (SZ)	56.0	54.4	55.2	-	-	-	-	-	-	-	55.2
OS-6 (NC)	77.9	55.3	66.6	82.7	79.2	81.0	84.7	106.0	60.1	83.6	82.7
Kent (NC)	62.3	44.4	53.4	86.7	72.8	79.8	85.7	143.0	50.9	93.2	79.8
SEm+	1.2	2.0	-	-	1.6	-	2.5	1.36	1.6	-	-
C D at 5%	3.4	6.2	-	5.5	4.9	-	7.2	3.89	5.1	-	-
<b>B. Nitrogen level (kg/ha)</b>											
40	55.6	45.0	50.3	57.3	73.3	65.3	79.1	102.0	41.0	74.0	68.8
80	70.0	52.4	61.2	76.9	76.3	76.6	82.4	113.0	55.2	83.5	81.2
120	85.7	60.6	73.2	106.7	79.4	93.1	85.6	116.0	65.2	88.9	90.6
SEm+	2.4	1.1	-	-	0.5	-	0.8	0.08	1.0	-	-
C D at 5%	7.5	3.2	-	4.9	1.4	-	2.2	0.23	2.9	-	-
<b>C. Interaction: Entry × N levels</b>											
SEm+	3.1	-	-	-	-	-	1.3	0.21	2.7	-	-
C D at 5%	NS	NS	-	-	NS	-	NS	0.61	NS	-	-
CV%	-	11.4	-	-	-	-	4.4	-	-	-	-

TABLE 5  
Crude protein yield (q/ha) in Central Oat OS 403 in different zones

Year	Locations	OS 403	National check		Zonal check			Qualifying varieties		
			Kent	OS 6	NWZ	NEZ	SZ	UPO-06-1	NDO-711	NDO-10
					OL-125	JHO-99-2	JHO 2000-4			
1st Year - 2011-12 (IVTO, SC)	15	8.0	6.5	7.0	6.1	8.9	6.5	7.1	8.0	8.0
2nd Year -2012-13 (AVTO, SC-1)	15	6.2	5.9	5.9	6.2	5.7	4.7	6.8	6.3	6.3
3rd Year -2013-14 (AVTO, SC-2)	15	6.8	6.6	5.9	6.1	5.0	5.3	6.3	6.9	6.2
Mean		7.0	6.3	6.3	6.1	6.5	5.5	6.7	7.1	6.8
Overall % superiority			11.1	11.1	14.8	7.7	27.3	4.5	-1.4	2.9

TABLE 6  
IVDMD (%) in Central Oat OS 403 in different zones

Year	Locations	OS 403	National check		Zonal check			Qualifying varieties		
			Kent	OS 6	NWZ	NEZ	SZ	UPO-06-1	NDO-711	NDO-10
					OL-125	JHO-99-2	JHO 2000-4			
2nd Year -2012-13 (AVTO, SC-1)	3	55.9	58.0	57.6	60.6	59.6	-	57.3	57.9	56.6
3rd Year -2013-14 (AVTO, SC-2)	1	64.9	66.7	61.7	-	-	63.1	62.3	62.7	66.6
Mean		60.4	62.4	59.7	60.6	59.6	63.1	59.8	60.3	61.6

Singh *et al.* (2015) reported that the plant height and protein content also increased with increasing N levels. It was almost at par with the checks and qualifying varieties for ADF and NDF%.

### CONCLUSIONS

The new variety Central Oat OS 403 exhibited superiority over the best national checks (Kent/OS 6 for GFY and DMY) and the best qualifying variety NDO-711. The new variety OS 403 also has superiority over the zonal checks *i.e.* JHO-99-2; JHO 2000-4 and OL 125.

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