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HFO 427: A SINGLE-CUT OAT VARIETY FOR SOUTH ZONE OF INDIA

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SUMMARY

The single-cut fodder oat variety, HFO 427, was developed by Forage Section, Department of Genetics and Plant Breeding, CCS Haryana Agricultural University, Hisar. It was released and notified for cultivation under timely sown, normal fertility and irrigated conditions during *rabi* season in South zone (Telangana, Tamil Nadu, Karnataka, Kerala and Andhra Pradesh) of the country. It was developed through pedigree method of breeding. HFO 427 gave 320.2 q/ha green fodder yield which was 12.6% and 12.5% more than the national checks Kent (284.5 q/ha) and OS 6 (284.7 q/ha), respectively. It showed superiority of 13.5% green fodder yield than the South zone check JHO 2000-4 (282.2 q/ha). In the case of dry matter yield, the variety HFO 427 (67.4 q/ha) out yielded the best national checks Kent (61.9 q/ha) by 8.9% and OS 6 (62.3 q/ha) by 8.2%. This variety out yielded the South zone check JHO 2000-4 (56.9 q/ha) by 18.4%. The variety HFO 427 gave a seed yield of 10.4 q/ha out yielded the best national checks Kent (9.47 q/ha) by 9.9% and OS 6 (7.78 q/ha) by 33.8%. This variety out yielded the zonal check JHO 2000-4 (8.97 q/ha) by 16.0%. The estimated crude protein content was 8.4% in HFO 427 which was at a par with the national checks Kent and OS 6 and zonal check JHO 2000-4.

Key words: Oat, single cut, green fodder, seed yield and crude protein

For rural economy, livestock is an integral part of agriculture which make huge contribution in terms of various dairy products and act as a major driving force for carrying out farm operations. Generally, livestock is not only the major source of cash income for marginal farmers but also provide insurance against crop failure. According to India's 20th Livestock Census, there is 4.6 percent increase in livestock population (535.78 million) compared to 19th Livestock Census (conducted in 2012), Also there is 1.0 percent increase of total bovine population comprising of buffalo, cattle and Yak which was 302.79 million in 2019 compared to previous census (Anonymous, 2019). Despite India having 192.49 million cattle and 109.85 million buffalo, the milk productivity is much lower than average for the world. Presently, India has a net scarcity of 11.24 percent green fodder, 23.40 percent dry fodder and 28.90 percent concentrates also (Roy *et al*., 2019). The productivity of fodder need to be increased in order to meet the increasing demand for quality fodder. The nutritive composition of fodder is important factor that decide the productivity and overall performance of livestock. The gap between demand and supply may be tapering down by increasing the productivity per unit area and time or identifying fodder oat varieties of desired traits like quick growing, drought tolerance, high yield potential and fertilizer & irrigation responsive which will adapt better under changing climatic scenario. Oat is a short duration and fast growing palatable fodder crop which produces significant amount of fodder with better nutritional quality (Phogat *et al.,* 2021). Increasing human population has left us with very limited resources for fodder cultivation as there is massive pressure on cultivated land and water assets which is required for fulfilling the increasing demand for food. Furthermore, the quality of fodder used in livestock feeding is most important, as it decide not only the productivity but also the milk and dairy products quality. Fodder quality is determined by several factors like variety, crop genetic constitution, time of harvesting, climatic factors and different biotic & abiotic stresses. Identification of location specific high yielding varieties with better nutritional quality is the prerequisite for higher productivity of livestock.

Varieties having improved yield potential that can also be cultivated at higher elevations compared to the current climatic restrictions for arable agriculture could alleviate some of the overgrazing pressures and demolition of forests. There was hardly any oat breeding program where the principal objective was developing fodder oat, and very diminutive work was

TABLE 1
Mean performance of green fodder yield (q/ha) in the South Zone of India

Year	No. of locations	Mean performance of proposed variety HFO 427	National check		Zonal check (South zone)	Qualifying varieties		
			Kent	OS 6	JHO 2000-4	SKO 227	JHO 15-1	JO 04-22
2015-16 (IVTO, SC)	4	252.8	227.4	248.2	257.4√	181.7	234.5	240.6√
% superiority			11.17	1.85	-1.79	39.13	7.80	5.07
2016-17 (AVTO-1, SC)	4	328.1	300.5	309.7√	273.3	313.6√	290.7	278.3
% superiority			9.18	5.94	20.05	4.62	12.87	17.89
2017-18 (AVTO-2, SC)	4	379.8	325.5√	296.3	315.8	268.2	350.9√	335.3
% superiority			16.68	28.18	20.27	41.61	8.24	13.27
Weighted Mean		320.2	284.5	284.7√	282.2	254.5	292.0√	284.7
Overall % superiority			12.56	12.46	13.48	25.82	9.65	12.46

√ =Indicates the best check/best qualifying variety
IVTO (SC) : Initial Varietal Trial in Oats (Single cut); AVTO (SC)-1: First Advanced Varietal Trial in Oats (Single cut)
AVTO (SC)-2: Second Advanced Varietal Trial in Oats (Single cut)
Locations (4): Hyderabad, Mandya, Coimbatore, Mattupetty.

TABLE 2
Mean performance of dry matter yield (q/ha) in the South Zone of India

Year	No. of locations	Mean performance of proposed variety HFO 427	National check		Zonal check (South zone)	Qualifying varieties		
			Kent	OS 6	JHO 2000-4	SKO 227	JHO 15-1	JO 04-22
2015-16 (IVTO, SC)	4	50.3	48.9	52.5√	48.6	43.9	48.5√	47.7
% superiority			2.86	-4.19	3.50	14.58	3.71	5.45
2016-17 (AVTO-1, SC)	4	67.5	67.3	69.9√	61.2	62.1	67.4√	59.8
% superiority			0.30	-3.43	10.29	8.70	0.15	12.88
2017-18 (AVTO-2, SC)	4	84.4	69.5√	64.5	61.0	61.1	74.9√	68.6
% superiority			21.44	30.85	38.36	38.13	12.68	23.03
Weighted Mean		67.4	61.9	62.3√	56.9	55.7	63.6√	58.7
Overall % superiority			8.89	8.19	18.38	21.01	5.97	14.82

√ = Indicates the best check/best qualifying variety
IVTO (SC) : Initial Varietal Trial in Oats (Single cut); AVTO (SC)-1: First Advanced Varietal Trial in Oats (Single cut)
AVTO (SC)-2: Second Advanced Varietal Trial in Oats (Single cut)
Locations (4): Hyderabad, Mandya, Coimbatore, Mattupetty.

in progress to develop genotypes for cultivation in the cool and high altitude areas (Kumar *et al.,* 2023). The available oats varieties were losing their yield potential with passage of time due to assorted climatic conditions and they are prone to damage by different biotic and abiotic stresses. Therefore, there was an urgent need to release varieties having better yield potential, nutritive value, resistance to biotic and abiotic stresses and ability to cope up with changing climate scenario. The new oats variety 'HFO 427' was high yielding, and rich in protein content. This paper has summaries on its development.

The single-cut oat variety, 'HFO 427' was developed by Forage Section, Department of Genetics & Plant Breeding, CCS Haryana Agricultural University, Hisar. It was released by the Central Sub-committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops & notified by Ministry of Agriculture & Farmers Welfare, (Department of Agriculture, Co-operation & Farmer's welfare) vide notification number S.O. 500 (E) dated 29th January, 2021 for timely sown, normal fertility and irrigated conditions in the *rabi* season of South zone (Telangana, Tamil Nadu, Karnataka, Kerala and

TABLE 3
Mean performance of HFO 427 in terms of per day productivity of GFY (q/ha/day) in the South Zone

Year	No. of locations	Mean performance of proposed variety HFO 427	National check		Zonal check (South zone)	Qualifying varieties		
			Kent	OS 6	JHO 2000-4	SKO 227	JHO 15-1	JO 04-22
2015-16 (IVTO, SC)	3	4.13	3.21	3.61√	3.62	2.90	3.50√	3.22
% superiority			28.66	14.40	14.09	42.41	18.00	28.26
2016-17 (AVTO-1, SC)	4	4.00	3.89	4.08√	3.43	3.80	3.86√	3.44
% superiority			2.83	-1.96	16.62	5.26	3.63	16.28
2017-18 (AVTO-2, SC)	4	4.65	4.20√	3.97	4.16	3.03	4.48√	4.18
% superiority			10.71	17.13	11.78	53.47	3.79	11.24
Weighted Mean		4.27	3.82	3.91√	3.75	3.27	3.99√	3.65
Overall % superiority			11.86	9.16√	13.95	30.40	7.09√	17.02

Conclusion: The proposed variety HFO 427 exhibited superiority to the best national check OS 6 by 9.16%; zonal check by 13.95% and by 7.09% with best qualifying variety JHO 15-1 for GFY (q/ha/day)
√ = Indicates the best check/best qualifying variety
IVTO (SC) : Initial Varietal Trial in Oats (Single cut); AVTO (SC)-1: First Advanced Varietal Trial in Oats (Single cut)
AVTO (SC)-2: Second Advanced Varietal Trial in Oats (Single cut)
Locations (4): Hyderabad, Mandya, Coimbatore, Mattupetty.

TABLE 4
Mean performance of HFO 427 in terms of per day productivity of dry matter yield (q/ha/day) in the South Zone

Year	No. of locations	Mean performance of proposed variety HFO 427	National check		Zonal check (South zone)	Qualifying varieties		
			Kent	OS 6	JHO 2000-4	SKO 227	JHO 15-1	JO 04-22
2015-16 (IVTO, SC)	3	0.77	0.72	0.77?	0.70	0.67	0.76√	0.67
% superiority			6.94	0.00	10.00	14.93	1.32	14.93
2016-17 (AVTO-1, SC)	3	0.90	0.95	1.04√	0.88	0.85	1.02√	0.82
% superiority			-5.26	-13.46	2.27	5.88	-11.76	9.76
2017-18 (AVTO-2, SC)	2	1.05	0.84	0.85√	0.85	0.59	0.96√	0.80
% superiority			25.00	23.53	23.53	77.97	9.38	31.25
Weighted Mean		0.89	0.84	0.89√	0.81	0.72	0.91√	0.76
Overall % superiority			6.43	0.00	10.56	24.04	-1.93	17.30

Conclusion: The proposed variety HFO 427 was at par with the best national check OS 6; exhibited superiority to zonal check by 10.56% for DMY (q/ha/day)
√ = Indicates the best check/best qualifying variety
IVTO (SC) : Initial Varietal Trial in Oats (Single cut); AVTO (SC)-1: First Advanced Varietal Trial in Oats (Single cut)
AVTO (SC)-2: Second Advanced Varietal Trial in Oats (Single cut)
Locations (4): Hyderabad, Mandya, Coimbatore, Mattupetty.

Andhra Pradesh) of the country. This variety has been registered with NBPGR having national identity number IC 633880. It was developed through pedigree method of breeding.

The variety HFO 427 gave 320.2 q/ha green fodder yield which was 12.6% and 12.5% more than the national checks Kent (284.5 q/ha) and OS 6 (284.7 q/ha), respectively. It showed superiority of 13.5% green fodder yield than the zonal check JHO 2000-4 (282.2 q/ha) in South zone (Table 1). In the case of dry matter yield, the Variety HFO 427 (67.4 q/ha) out yielded the best national checks Kent (61.9 q/ha) by 8.9% and OS 6 (62.3 q/ha) by 8.2%. This variety out yielded the zonal check JHO 2000-4 (56.9 q/ha) by 18.4% (Table 2).

The variety HFO 427 also gave 9.2% higher

TABLE 5
Performance of HFO 427 in terms of seed yield (q/ha) in the South Zone

Year	No. of locations	Mean performance of proposed variety HFO 427	National check		Zonal check (South zone)	Qualifying varieties		
			Kent	OS 6	JHO 2000-4	SKO 227	JHO 15-1	JO 04-22
2017-18 (AVTO-2, SC)	2	10.41	9.47√	7.78	8.97	4.07	9.35	9.97√
Overall % superiority			9.93√	33.80	16.05	155.77	11.34	4.41√

Conclusion: The proposed variety HFO 427 gave a superiority of 9.93% over the best national check Kent; by 16.05% over zonal check JHO 2000-4 and by 4.41% over best qualifying variety JHO 04-22 for seed yield.
Locations (2): Hyderabad, Mandya.

TABLE 6
Performance of HFO 427 in terms of crude protein content (%)

Year	No. of locations	Mean performance of proposed variety HFO 427	National check		Zonal check (South zone)	Qualifying varieties		
			Kent	OS 6	JHO 2000-4	SKO 227	JHO 15-1	JO 04-22
2015-16 (IVTO, SC)	3	6.73	8.47	8.43	8.33	9.63	9.33	7.00
2016-17 (AVTO, SC-1)	3	10.67	10.63	11.50	9.17	10.77	10.50	10.07
2017-18 (AVTO, SC-2)	4	7.88	8.32	8.64	8.74	9.08	7.68	9.09
Weighted Mean		8.37	9.06	9.44	8.75	9.75	9.02	8.76

Conclusion: The proposed variety HFO 427 is almost at a par with the checks and best qualifying variety.

per day productivity of GFY over best national check OS 6 while it gave 7.1% higher GFY per day productivity over the best qualifying variety JHO 15-1 (Table 3). The variety HFO 427 is at par for per day productivity of DMY over the national checks and exhibited a gain of 10.6% over zonal check JHO 2000-4 (Table 4). The variety HFO 427 gave a seed yield of 10.4 q/ha (Table 5) and out yielded the best national checks Kent (9.47 q/ha) by 9.9% and OS 6 (7.78 q/ha) by 33.8%. This variety out yielded the zonal check JHO 2000-4 by 16.0%. On dry matter basis, the estimated crude protein content was 8.4% in 'HFO 427' fodder which was at a par with the national checks Kent (9.1%) and OS 6 (9.4%) and zonal check JHO 2000-4 (8.8%) (Table 6).

CONCLUSION

With good nutritional quality and average green fodder yield of 320.2 q/ha, HFO 427 is a single-cut fodder oat variety that suits well to the South zone of India. It possesses all the features of a good fodder yielder along with improved nutritional quality. Hence, it is expected that this variety will boost the fodder production and animal output in South Zone of the country.

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