

Material and Methods

MATERIALS AND METHODS

Smut fungi normally appear and show their luxuriant growth from monsoon to late winter in this part of country. The species described in this work, were mainly collected from the different localities of the South Western parts of the Maharashtra State viz. Kolhapur, Ratnagiri, Savantwadi, Panhala, Amboli, Bhogavati, Mahabaleswar, Radhanagri, Karad, Pune, etc. which were visited periodically throughout the span of this work and were mainly the members of the family Poaceae, Polygonaceae, Rubiaceae, Cyperaceae, Commelinaceae, Convolvulaceae, Acanthaceae, Asteraceae etc. The fresh materials were collected separately in the paper envelopes as well as in polythene bags and brought to the laboratory along with their healthy reproductive hosts if available for further observations. At the time of collections, field observations such as locality, date of collection, host and its association etc. were also noted. Healthy hosts generally reproductive, were also collected and identification of them was made by using upto date taxonomic literature. The fresh materials were dried separately in the papers and kept in brown paper pockets properly labelled and deposited in cardboard boxes. #

Along with the fresh collections, some collections which were made but not studied, were also studied especially of

Late Prof. (Dr.) S.D. Patil and some those collected by Dr. M.S. Patil.

The detailed observations were made repeatedly of each taxa from different localities in respect of symptoms, sorus, spores, severity, part affected, morphology, etc. of the fresh and dry collections as per the routine laboratory methods to note macroscopic and microscopic details.

For details of the spores i.e. ornamentation, measurements and other details were made with the help of compound microscope, by preparing semipermanent slides and by observing it under light microscope. At first the materials were mounted in water to see the natural size and colour of the spores. For black spore balls, in which the ornamentation is very difficult to see, especially the black spore balls, were, bleached in concentrated H_2O_2 solution for five to fifteen minutes. For the semipermanent preparation a drop of lactophenol was taken on clean glass slide and spores were picked up with the help of needle from unopened but matured sorus slightly moistened with the lactophenol or the sections if found necessary, were taken by hand with razor blade and stained with 0.1% cotton blue in the Lactophenol. The slides were made semipermanent, sealed by sealent (nail polish, Bee wax or paraffin wax) and properly labelled and numbered.

All the slides were critically observed under light microscope to study morphological details and measurements were made. Detailed sketches were made with the help of 'Erma Camera Lucida' at the stage level, using 10X, 45X, 100X (oil immersion) objectives. Choice of the combination of eyepiece and objectives varied according to the size of the spores. The measurements were made by using 6X, 10X and 15X 'Ernst Wetzlar Occular' and 10X, 45X and 100X objectives.

Photomicrographs of the structural details wherever found necessary were taken by using 'Ernst Lietz Wetzlar's' photographic unit and the photographs of habit were made by 'Pentax Camera' at desired magnification to get the details. Spore germination of smut is an essential part to know its taxonomical position wherever possible. An attempt has been made to germinate the teleutospores of a few taxa in the laboratory by using glass slide condensed method. Different methods are used for the germination of the teliospores. One of the commonest methods is condensed water method (Thirumalachar, 1940) in which the spores are germinated in water on slide. Another method used by Patil and Gandhe (Ph.D. Thesis, 1978) was the slight modification of the first method, in which teliospores suspension was spread on the clean glass slide, slide was allowed to dry, after drying the slide was immersed in the solution of Potassium permanganate for five to twenty minutes. The

concentration of the solution and duration of treatment depends upon the thickness of the sopro wall. In the present investigation the concentration of KMnO_4 is 2% and the duration of treatment is 7-10 minutes. In addition to this, other chemicals such as dilute HCl , H_2O_2 , bleaching powder etc. were also used to stimulate the germination. The slides were washed with sterile distilled water and then were kept inversed for germination on thick glass rods in petri dishes. The dishes were kept moist with moist blotting paper or cotton in laboratory at usual conditions.

Duran (1973) has used the following media for germination of spores of smut fungi i.e. 2% potato dextrose agar (PDA), corn meal agar (CMA), soil extract agar (SEA) and/or water agar (WA). The smut spores can be germinated in sugar solution too.

Thus, the germination was observed periodically under the microscope to ensure whether the germination occurred or not, if the spores showing germination were stained by cotton blue and semipermanent preparations were made in lactophenol for further observations after sealing. Sketches were made with Camera Lucida as per routine procedure.

The identification of genera, species and varieties were confirmed with the help of following literature: Mc Alpine (1910), Liro (1924), Anisworth and Sampson (1950), Mundkur and Thirumalachar (1952), Fischer and Holton (1957), Butler

and Bisby (1960), Duran and Fischer (1961), Duran (1973), Sorbhoy *et al.* (1975), Bilgrami *et al.* (1979,81); Kamat *et al.* (Bhide *et al.* (1979). etc. as well as standard keys were referred for identification of taxa under investigation. Host specificity has been also used wherever it is found possible along with the morphology and mode of spore germination. The new taxa, new combination, new to India have been described in detail, while others have been only listed with remarks.

All the collections, semipermanent slides, Camera Lucida sketches were properly labelled and numbered and deposited in the Mycology Herbarium, Dept. of Botany, Shivaji University, Kolhapur Under WEF (Fungi of Western India).

STATISTICAL SUMMARY OF THE TAXONOMICAL STUDIES OF THE SMUTS FROM SOUTH WESTERN MAHARASHTRA

Class	Order	Family	Genus	Species	Variety	Host & Family	Remarks
Telionycetes	Ustilaginales	Ustilaginaceae	I.Ustilago	1.U. eugenula	-	1.Eragrostis sps.	New to State
				Syd and Butl.		(Poaceae)	
				2.U. cruss-gali	-	2.Echinochloa	New to State
				Tracy & Earle		colonum L.	
						and	
						3.Echinochloa	
						frumentaceae	
						(Rozb.) Link	
						(Poaceae)	
				3.U. montagnei	Var.Major	4.Rhynchospora	New to India
Tul.	Dasgaziers	wightiana Steud.					
		(Cyperaceae)					
4.U. operata	-	5.Brachiaria reptans	New to State				
Syd. & Butl.		(L.) Gard.& C.E.					
		Hubb.					
5.U.urticulosa	-	6.Polygonum	New host				
(Nees) Tul.		serrulatum Lag.					
		(Polygonaceae)					
6.U. idonia	-	7.Dactylactanium	New to State				
Syd. & Syd.		aegypticum (L.)					
		P. Beauv.					
7.U. sparsa	-	Dactylactanium	New to State & new host				
Underwood		aegypticum					
		(L.) P. Beauv.					
		(Poaceae)					
8.U.brevifoliae	-	8.Eleusine brevifolia	New species				
sp. nov.		Wild					
		(Poaceae)					
II.Sorosporium	9.S. andropog-	-	9.Andropogon	New species			
	nicola sp. nov.		pumilus Roxb.				
			(Poaceae)				
	10.S.spirocolu-	-	Unidentified	New species			
	mellae sp. nov.		Sedge				
			(Cyperaceae)				

Table Cont.....

	11. <i>S. contortus</i> Griffiths	-	10. <i>Heteropogon contortus</i> (L.) P. Beauv. (Poaceae)	New to State
	12. <i>S. holstii</i> P. Henn.	-	11. <i>Themeda</i> sp. (Poaceae)	New to State
	13. <i>S. apluda</i> Mishra	-	12. <i>Apludā mutica</i> L. (Poaceae)	New Host
	14. <i>S. tumifaciens</i> Mc. Alpine	-	13. <i>Chrysopogon asciculatus</i> Trin. (Poaceae)	New to State
III.				
Cintractia	15. <i>C. minor</i> (Clinton) Jackson	-	14. <i>Cyperus carymbosus</i> Rottb. (Cyperaceae)	New host
IV.				
Farysia	16. <i>F. butleri</i> (Syd.) Sydow	-	15. <i>Scleria stoksiana</i> Boeck (Cyperaceae)	New to State
V.				
Sporisorium	17. <i>S. holcisorgh</i> (Rerolta) Vanky	-	16. <i>Sorghum</i> sp. (Poaceae)	New to India
	18. <i>S. coicis</i> (Bref) comb.	-	17. <i>Coix lachrym-jobi</i> L. (Poaceae)	New com- bination
	19. <i>S. flagellatum</i> (Syd. & Butl.) comb. nov.	-	18. <i>Ischaemum</i> sp. (Poaceae)	New com- bination
	20. <i>S. furcatum</i> (Syd. & Butl.) Comb. nov.	-	19. <i>Ischaemum</i> sp. (Poaceae)	New com- bination
	21. <i>S. neglectum</i> (Niessl) Vanky	-	20. <i>Setaria glauca</i> (L.) P. Beauv. (Poaceae)	New to India
	22. <i>S. pseudanthistiriae</i> sp. nov.	-	21. <i>Pseudanthistiria hispida</i> Hook. f. (Poaceae)	New species

Table Cont.....

		23. <i>S. tanglinensis</i> -	22. <i>Sehima nervosus</i> -	New combination
		(Tracy & Earle)	(Rottl.) stapf	
		(Zund.) Comb.	(Poaceae)	
		nov.		
		24. <i>S. vryburgii</i> -	23. <i>Themeda triandra</i> -	New combination
		(Zundel) comb.	Forsk. (Poaceae)	
		nov.		
		25. <i>S. polytae-</i> -	24. <i>Chionachne koen-</i> -	New combination
		<i>barbatae</i>	<i>igii</i> Thur.	
		(Mund.) comb.	(Poaceae)	
		nov.		
Tilletiaceae	VI.			
	Tilletia	26. <i>T. eleusine</i> Syd. -	25. <i>Salaria interae-</i> -	New to State
			<i>dia</i> (Rottl.)	
			R. and S.	
			(Poaceae)	
		27. <i>T. tronsvaal-</i> -	26. <i>Eragrostis</i> sp. -	New to State
		<i>ensis</i> Zun.	(Poaceae)	
		28. <i>T. Sehinae</i> -	27. <i>Sehima nervosus</i> -	New species
		sp. nov.	(Rottl.) Stapf.	
			(Poaceae)	
		29. <i>T. spodiopog-</i> -	28. <i>Spodiopogon rhi-</i> -	New species
		<i>onae</i> sp. nov.	<i>zophorus</i> (st.)	
			Pilger (Poaceae)	
	VII.			
	Doassans-	30. <i>D. hygrophilae</i> -	29. <i>Hygrophila angus-</i> -	New host
	<i>ia</i>	Thirum	<i>tifolia</i> R.Br.	and D.Kh-
			(Acanthaceae)	<i>andalensis</i>
				Gandhe and
				Patil made
				synonymous
	VIII.			
	Melanota-	31. <i>M. eragrostidis</i> -	30. <i>Eragrostis</i> sp. -	New species
	<i>enium</i>	sp. nov.	(Poaceae)	
	IX.			
	Urocystis	32. <i>U. carculigoidis</i> -	31. <i>Curculigo arch-</i> -	New species
		sp. nov.	<i>ioides</i>	
