a few apparently normal seeds from the following crosses : *P. alata* × *P. edulis* *P. alata* × *P. laurifolia; P. edulis* × *P. caerulea.*

In the present study *P. incarnata* could not be used as a male parent because of pollen abnormalities and hence it was used as a female parent. Payan and Martin[5] have observed differences in reaction of species *P. edulis* f. *flavicarpa* which proved to be quite fertile when used as a female, but was completely unsatisfactory as a male parent. They have also observed that *P. laurifolia*, a highly self-incompatible species that seldom sets seed in self-pollination, proved to be an efficient male parent.

This study shows very clearly that the self-incompatibility found in many passion fruit species, and believed to result in very poor pollen tube growth, was not a barrier to interspecific crosses. Pollen germination and tube growth appeared perfectly normal in *P. quadrangularis* but not in case of *P. incarnata*. The only obstacle to hybridization was a failure of hormonal stimulation. When growth-promoting substance (indoleacetic acid) was applied to the ovary, fruit set was promoted, and fruiting could be normal. None of the seeds germinated but it does not mean that the seeds from hybrid fruits contained aborted embryos as their abortiveness could have been confirme only after trying to germinate them in embryo culture chamber.

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INVESTIGATIONS ON VASCULAR BROWNING IN THE ROOTS OF ROOT (WILT) DISEASED COCONUT (*COCOS NUCIFERA* LINN.)

Vascular browning/discolouration in plant parts has been reported as a characteristic symptom of certain plant diseases[1,2]. Root (wilt) disease of conconut is of uncertain etiology but suspected to be pathogenic in nature[3]. Earlier investigations have shown that in apparently healthy roots of diseased, and, apparently healthy palms of root (wilt) affected area, vascular browning occurs in the order of 20 to 88% and 20 to 35% respectively, which did not exist in the roots of palms from a healthy area[3-6]. These observations merit consideration since emphasis was given by coconut research workers in the past to isolate patnogens from vascular tissues showing browning. The browning or discolouration of tissues when they are cut and exposed, can be attributed to auto-oxidation and increased activity of oxidising enzymes too[7-9]. Detailed studies were, therefore, undertaken to ascertain the occurrence of vascular browning, its nature and extent in the roots of coconut palms.

Apparently healthy (AH) root tips from different depths of the soil and distances were collected during rainy and summer seasons from 25 palms of healthy area and 47 apparently healthy (AH) and 65 diseased palms of diseased area, belonging to West Coast Tall (WCT) variety of coconut. The condition of palms was judged on the basis of symptoms described by Radha and Lal[10]. In total, 476 root tips consisting of 100, 146 and 230 roots from healthy, apparently healthy and diseased palms respectively were examined. Root tips (about 10 cm length) were cut and kept in water and antioxidant solution (2%, ascorbic acid/mercaptoethanol) separately in the field itself. They were soon brought to the laboratory and split longitudinally into two equal halves, cleaned and transferred into water and anti-oxidant. About one cm length including root cap was discarded from root tip. Free hand sections, from 2·5 cm of root tip were cut in respective solutions and examined immediately under microscope. Apparently healthy root tips kept in water/antioxidant for about half an hour on critical examination when showed any external lesions, were not considered as AH and discarded.

Microscopic examination of root-sections, immediately after sectioning in water or antioxidant did not reveal vascular browning in any of the roots collected from healthy, AH and diseased palms (Table 1). In water, after the lapse of about 2 minutes, most of the sections showed general very pale browning. The root sectioned in water when kept for about 5 minutes and more, showed browning of all the tissues including vascular ones. But sections in antioxidants did not produce any such discolouration. Thus browning of root tissues, sectioned in water is not original but only an after effect caused by oxidation.

Antioxidant prevented further browning of tissues but did not remove stationary discolouration. Experiments revealed that the superficial browning of tissues developed in water due to oxidation is removed by repeated washing in water followed by antioxidants

TABLE I

Observations on browning of vascular region in roots of coconut (Cocos nucifera *Linn.*)

Condition of Palms	Number of palms	Number of roots examined	Roots showing vascular browning			
			Immediately after Sectioning		5 minutes and more after Sectioning	
			Vascular region		Vascular region	
			Water	*Antioxidant	Water	*Antioxidant
Healthy	25	100	nil	nil	100	nil
Apparently healthy	47	146	nil	nil	146	nil
Diseased	65	230	nil	only one	230	only one

* 2% ascorbic acid or mercaptoethanol.

but original discolouration of tissues was not removed. This is evident by certain exceptional observations, where irrespective of the condition of palms three roots, out of 476 roots examined, showed non-specific discolouration in both water and antioxidants. One root-section had dark walls in two to three cells between largest metaxylem and the second had general discolouration of an entire section. In the third root non-specific discolouration/browning was noticed in the stele of one of the sections in antioxidant. But the remaining section of the same root either in water or antioxidant did not show browning. This further proves that original brown colour of tissues is not washed off by antioxidant solution but it helps in understanding natural discolourations of tissues.

These results bring out that vascular browning does not exist *in situ* in externally healthy roots of diseased palms to any significant level. In the present studies, particular care was taken in selecting apparently healthy roots and reducing the chances of mechanical injury, folding of roots and auto-oxidation and completing sectioning and microscopic examination in shortest time. These might be the reasons that the roots sectional in water too did not show vascular browning in this investigation.

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PHOTOSPOROGENESIS IN *CERCOSPORA PERSONATA* AS INFLUENCED BY GLYCINE, RIBOFLAVIN AND MALONIC ACID

IT was earlier reported from this laboratory[1,2] that *Cercospora personata* required light for sporulation and that glycine as nitrogen source and riboflavin or malonic acid added to the medium, considerably enhanced light-induced sporulation. Glycine also stimulated growth of the fungus[2] and part of the increase in spore numbers could have been the consequence of the increased biomass. The possibility remained, however, that the sensitivity of the fungus to light had actually been increased by these compounds. The experiment reported here was meant to test this possibility.