

Occurrence of *Azospirillum* in Some Cultivars of Rice Grown Under Agro Climatic Conditions of Himachal Pradesh

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Azospirillum lipoferum is a very common root and soil inhabiting nitrogen fixing bacterium in the tropics. (Dobereiner et.al. 1976). The distribution of the bacterium in India and mode of bacterial colonization in plant roots has been well reported. The occurrence of nitrogen fixing *A. lipoferum* is wide spread in roots of several cultivars of rice and weeds associated with rice plants. (Khan and Akond, 1994; Chauhan, 1995). However, its occurrence with rice cultivars under agro climatic conditions of Himachal Pradesh is not known. Thus, an extensive survey was conducted in district Kangra a typically hilly areas to find out the natural incidence of associative symbiosis of *Azospirillum* in some cultivars of rice grown in Himachal Pradesh.

The natural incidence of *Azospirillum* was estimated in root samples of rice collected from different locations of Himachal Pradesh. Root samples of different varieties of rice were collected, washed, cut into 2 mm segments and mixed thoroughly. Small pieces of washed roots were placed in semi-solid agar medium containing sodium malate (Dobereiner *et al.*, 1976). The presence of *Azospirillum* was examined in the form of a characteristic pellicle formed 1-2 mm, below the upper surface of the medium and where characteristic pellicle were formed, It was recorded as positive for *Azospirillum*.

Distribution of *Azospirillum* in nature was more specific to location rather than the cultivars of rice (Table 1). In areas like Mandi, Nagrota and Nurpur, it was abundantly distributed in nature whereas in Bilaspur, Dhaulakuan, Kangra, Palampur, Sundernagar and Una it was poorly distributed. The population and occurrence were affected by various agricultural and horticultural practices, particularly fertilizer and pesticide application and crop rotation. A number of factors including plant type and age, soil type, agricultural practices, composition of the microbial community, root constituents and chemical compounds applied to the soil and plants may influence the ecology of *Azospirillum* (Baladreau, 1986). Further, *Azospirillum* was poorly associated with some cultivars of rice like Himdnan and Chhota Permal.

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Table 1. Occurance of Azospirillum in cultivars of rice grown in Himachal Pradesh

Location	No. of cultivars	Occurrence of Azospirillum	
		(+)	(-)
Bilaspur	3	1	2
Dhaulakuan	2	—	2
Kangra	3	1	2
Mandi	11	8	3
Nagrota	15	9	6
Nurpur	4	2	2
Palampur	41	18	23
Sundernagar	3	1	2
Una	3	1	2