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Screening of siderophore producing bacteria from various habitat

SARASWATI L. SAWARGAONKAR[1]*, S.L. SAWARGAONKAR[2], S. SAJEED ALI[1] AND SHRINIVAS L. SAWARGAONKAR[3]

[1]Department of Plant Biotechnology, Yeshwant College of IT, PARBHANI (M.S.) INDIA

[2]Department of Genetics and Plant Breeding, Martahawada Agricultural University, PARBHANI (M.S.) INDIA

[3]Department of Bio-informatics, Yeshwant College of IT, PARBHANI (M.S.) INDIA

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SUMMARY

Siderophore producing bacteria were isolated from different habitat, such as rhizospheric soil and alkaline soil. Out of 8 isolates 5 showed Siderophore production on Chromo azurol S (CAS) agar plate. Further the types of Siderophore are detected by (Csaky, 1948 and Arnow, 1937) assay. Estimation of Hydrozymate and chatcolate type of Siderophore revealed that out of five isolate a *Pseudomonas* species of alkaline soil produced high concentration of Siderophore as compared to other. To improve further yield of Siderophore the strain is grown on different medium and effect of incubation time was also studied. Maximum Siderophores were produced at 36 hours on succinate medium.

Key words : Screening, Siderophore producing bacteria.

Iron is one of the most abundant mineral on earth and is an essential requirement for living organism, however iron in the soil is unavailable for direct assimilation to microorganism because it is present in ferric ion or Fe (III) which is sparingly soluble *i.e.* solubility is about 10^{-18} M at pH 7.4 and this amount of soluble iron is much low to support microbial growth. To overcome this deficiency bacteria synthesize and secret low weight (400 to 1.000 d) iron binding molecules called siderophore in almost any environments including inside a host, in the soil, or other habitats. Also siderophore synthesis is regulated by iron concentration. There are over 500 described siderophores (Wandersman and Delepelaire, 2004) that are classified based on their chelating group specific for ferric iron. There are two main siderophore classes, the catechol – type and the hydroxymate-type. Catechol-type siderophore bind ferric iron with adjacent hydroxyls of catechol ring, and are almost always derived from 2,3-dihyroxybenzoic acid (DHBA) (Crosa and Walsh, 2002). The best studied example of a chatcolate type siderophore bind ferric iron with adjacent hydroxyls of chatcolate rings and are almost always derived from 2,3-dihydroxybenzoic acid (DHBA) is enterobactin, which produced by *E. coli* (O'Brien and Gibson, 1970). Hydroxamate type siderophore contains a carboxyl group attached to adjacent nitrogen, which chelates ferric iron. An example of this type is ferrichrome a fungal siderophore produced by *Ustilago sphaerogena* (Emery, 1971). Hydroxamates are generally more complex structurally and are also considered more hydrophilic in nature. In addition to these classes, a miscellaneous class of siderphore has also been established. Siderophores belonging to this class may contain catechol and Hydroxamate groups, which is the case for hetrobactin produced by *Rhodococcus erythropolis* (Carran *et al.*, 2001) or other groups responsible for iron chelation. The binding capabilities vary depending on the siderophore enterobactin has a stability constant (Kf) of 1052 for ferric ion, while ferrichrome exhibits a (Kf) of 1029 (Hofte, 1993).

Siderophores are secondary metabolite and are assembled by nonribosomal cytoplasmicpeptide synthases (Wandersman and Delepelaire, 2004). Siderophore plays important role in availability of iron to plant roots. Hydroxamate siderophores are present in soil at a high concentration which are enough to be useful to plant roots (10-7-10-8) (Powel *et al.*, 1980). Inoculation of soil with *Pseudomonas putida*, which produced Pseudobactin as its siderophore increase growth and yield of potato, sugar beet and radish and mainly act by depriving deleterious fungi and bacteria of iron or by supplying the plant roots with iron, via. Pseudobactin (Kloepper *et al.*, 1980).

MATERIALS AND METHODS

A number of bacterial strains of *Pseudomonas* were isolated from various habitats such as Rhizospheric soil of sugar cane, groundnut, tur, soybean, and alkaline soil of pH 11 from Lonar lack. Initially the isolates were grown on citramide medium for 24-48 hr at 28°C. Isolated morphologically distinct colonies were purified further by repeated streaking on fresh citramide medium. All the *Pseudomonas* species of different habitat were screened for siderophore production using chromo azurol S agar

* Author for correspondence.