

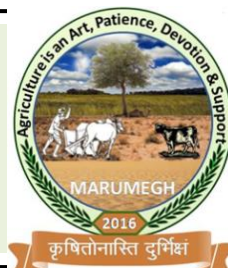
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WEED MANAGEMENT IN DIRECT- SEEDED RICE UNDER *TARAI* CONDITIONS OF UTTARAKHAND

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What are weeds?

Weed is a plant growing out of place and time where it is not desired. Thus, any plant other than economic crop in a system is called as weed. In agriculture, weeds may be defined as that part of the non crop vegetation that reduce quality and quantity of existing crops to such an extent that any benefits accrued from weeds can't compensate for the unfavorable effects left on the crop. All weeds are prolific, persistent, competitive, aggressive, harmful and even poisonous.









Why DSR have more weed infestation than TPR








Decline in productivity level and yield reduction due to weed infestation is more critical in direct- seeded rice system as compared to transplanted rice. The competitive advantage of transplanted rice (TPR) over direct seeded rice (DSR) is generally due to the use of 4-5 weeks old seedlings which compete with the emerging weed flora in the field and suppress their growth. Second reason of lesser weed infestation in TPR over DSR is that the weeds emerging after transplanting are controlled by flooding transplanted rice. Puddling also reduces weed infestation by allowing weeds towards anoxia. More than 50 weed species infest direct-seeded rice, causing severe competition in rice production worldwide (Verma and Singh, 2019).

In India, herbicidal weed management practices became popular for controlling weeds which is likely to increase further due of several constraints faced by Indian farmers like labor scarcity and rising wages etc. but certainly use of chemicals for controlling weeds offer certain disadvantages also which are summarized as under:

- Indiscriminate and irrational use of chemical herbicides (improper time of application, doses as well as methods) is driving the natural agro-ecosystems towards diversity declining level hence loss of sustainability and quality of ecosystem.
- Chemical weed management in DSR may offer build up of resistance and tolerance by specific weed flora against herbicidal effect.
- Continuous use of a single herbicide can produce quantitative changes in weed community composition in just five years.
- However, rice herbicides also show narrow spectrum activity and very limited herbicides are available which is having broad spectrum activity, and hence rarely provide season long weed control.

Common weeds found in direct seeded rice

Weed flora		Source
 <p><i>Echinochloa crus-galli</i></p>	 <p><i>Echinochloa colona</i></p>	<p>Verma <i>et al.</i>, (2017 a)</p>
 <p><i>Leptochloa chinensis</i></p>	 <p><i>Cyperus rotundus</i></p>	
 <p><i>Cyperus rotundus</i></p>	 <p><i>Cyperus difformis</i></p>	
 <p><i>Cyperus iria</i></p>	 <p><i>Fimbristylis milliacea</i></p>	

 <p><i>Eclipta alba</i></p>	 <p><i>Ammania baccifera</i></p>	<p>Ravishankar and Chandra shekharan, (2003)</p>
 <p><i>Ludwigia parriflora</i></p>		
 <p><i>Caesulia axillaris</i></p>	 <p><i>Commelina diffusa</i></p>	
 <p><i>Commelina benghalensis</i></p>	 <p><i>Euphorbia spp</i></p>	<p>Ram <i>et al.</i>, (2004)</p>

There is also a need to have efficient, economical and ecologically viable weed management technologies for controlling predominant weed flora associated with direct seeded rice which will avoid certain problems like weed shift, herbicidal resistance and

ensure good soil health and ecological balance. In a field study, it has also been observed that non- chemical weed management practices offers congenial environment for beneficial microbial proliferation viz. bacteria, fungi and actinomycetes as compared to herbicidal treatments. (Verma *et al.*, 2017 b)

In a field study, during *kharif* season of 2014 at Dr. N. E. Borlaug Crop Research Centre, Pantnagar, Verma *et al.*, 2017 a revealed that lowest weed density as well as weed dry matter at 25 days stage in direct seeded rice was found in plots treated with pre emergence application of pendimethalin (30 EC) @ 1.25 kg a.i. /ha followed by one hand weeding at 25 days after sowing (DAS) which can be recommended for achieving significant control of weeds, higher weed control efficiency as well as higher grain yield with enhanced productivity.

Penoxsulam is another herbicide for post emergence control of grasses, BLWs and sedges which is an acetolactate synthase (ALS) inhibitor. In a field experiment, Singh *et al.*, 2016 observed that post emergence application of this herbicide @ 25 g a.i/ ha achieved significantly higher grain yield of direct seeded rice, weed control efficiency and lesser weed infestation.

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