

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/319848745>

# Weed management in oilseed crops

Presentation · October 2016

DOI: 10.13140/RG.2.2.36203.85289

CITATIONS

0

READS

2,448

2 authors, including:



**Surinder Singh Rana**

CSK HPKV Palampur

578 PUBLICATIONS 983 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Teaching in Agronomy [View project](#)



AICRP-MULLaRP (Off-season pulses nursery) [View project](#)

# Integrated weed management in oilseeds



**RAVEENA JALANDHRA AND  
SURINDER SINGH RANA**

**DEPARTMENT OF AGRONOMY,  
CSK HIMACHAL PRADESH KRISHI  
VISHVAVIDYALAYA, PALAMPUR  
176062, HP, INDIA**

**EMAIL: RANASS\_DEE@YAHOO.COM**



- ❑ Oilseeds plays important role in human health . Oilseed crops are grown primarily for the oil contained in their seeds. Oilseeds are rich in protein, and in addition they contain a high level of fat.
- ❑ Oilseeds add important nutritional value to the diet due to high quality protein and or vegetable oil, together with oil soluble vitamins like vitamin A.
- ❑ The major oilseeds crops are soybean, sunflower, rapeseed, cotton and peanut etc and oil content ranges about 20% for soybean to over 40% for sunflower, linseed (37-47%) and rapeseeds(35-46%), Groundnut (46-51%) respectively (Gunstone et.al ,2013).

# Indian scenario on oilseeds

- Three main oilseed accounted over 88% of total oilseeds. Soybean is most important crop with an estimated production of 11.6 MT grown mainly in Madhya Pradesh, Maharashtra and Rajasthan accounting for more than 95% of total production. The 2<sup>nd</sup> most important crop is rapeseed-mustard (7.1 MT ) mainly grown in Rajasthan, Haryana, Uttar Pradesh, West Bengal and Gujarat estimated 93% of total production and groundnut is 3<sup>rd</sup> most important crop (6.9 MT) grown in Gujarat, Andhra Pradesh, Tamil Nadu etc. with a combined share of 91% in the total production in the country. (GOI, 2013)

# Himachal Scenario

- ❑ **The cropping pattern of Himachal Pradesh is dominated by cereal crops (84.0%), followed by fruits (6.0%) and vegetables (4.0%) (Gupta 2004)**
- ❑ **Area of oilseed during 2009-10 is estimated to be 13.18 (000, ha) with a production of 3.13 (000 MT)**

# Weed problems



- Weeds are a major problem to crop production through their ability to compete for resources and their impact on product quality.
- Weeds are known to account for nearly one third of the losses due to various biotic stresses.
- In India, presence of weeds in general reduces crop yields by 31.5% in kharif, 22.7% in winter season and 36.5% in summer and in some cases can cause complete devastation of the crop (Anonymous, 2007).
- Weed problem is a major input cost of crop production.

# Critical period

| <b>Oilseeds</b>  | <b>Critical period ( days)</b> | <b>% reduction in yield</b> |
|------------------|--------------------------------|-----------------------------|
| Sesamum          | 15-45                          | 15-45                       |
| Groundnut        | 40-60                          | 40-50                       |
| Sunflower        | 30-45                          | 30-60                       |
| Castor           | 30-50                          | 30-35                       |
| Safflower        | 15-45                          | 15-40                       |
| Rapeseed mustard | 15-40                          | 15-30                       |
| Linseed          | 20-45                          | 30-40                       |
| Soybean          | 20-45                          | 40-60                       |

Rana et.al, 2015

## Major weed flora of oilseed crops grown during Kharif season



*Digitaria sanguinalis, Xanthium strumarum*  
*Euphorbia geniculata, Amaranthus viridis,*  
*Portulaca oleraceae, Conyza aegyptiaca,*  
*Dinebra retroflexa, Panicum repens, Cynodon*  
*dactylon, Cyprus rotundus, Cyprus iria,*  
*Tribulus terrestris, Cenchrus biflorus,*  
*Corchrus rarvensis, Trianthema monogyna,*  
*Echinochloa colona, Setaria viridis.*



## Major weed flora of Rabi oilseed crops



*Chenopodium album, Chenopodium murale, Argemone maxicana, Anagalis arvensis, Asphodelus tenuifolius, Avena fatua, Boerhaavia spp., Brassica Kaber, Brassica sinensis, Chrozophera perviflora, Cirsium arvensis, Cynodon dactylon, Cyprus spp., Euphorbia geniculata, Euphorbia hirta, Fumaria parviflora, Lathyrus aphaca, Medicago denticulata, Melilotus alba, Melilotus indica, Melotropicum indicum, Parthenium hysterophorus, Physalis minima, Solanum nigrum, Spergula arvensis, vicia hirsuta.*



Photo: Chris Gardiner ©

***Cynodon dactylon* (Perennial)**



***Echinochloa Colona* (Kharif)**



Copyright © NativePlantFam  
<http://davegardens.com/members/NaivePlantFam/>  
Unauthorized Use Prohibited

***Dactyloctenium aegypticum* (kharif)**



***Avena ludoviciana* (Rabi)**



***Elusine indica (Kharif)***



***Lolium temulentum (Rabi)***



***Sorghum halepanse (Kharif)***



***Phalaris minor (Rabi)***



*Chickweed (Stellaria media) annual*



*Plantago sp. biennial*



*Polygonum persicaria (annual)*



*Fumaria officinalis (annual)*



***Trianthema portulacastrum* (Kharif)**



***Amaranthus viridis* (Kharif)**



***Ageratum conyzoides* (Perennial)**



***Parthenium hysterophorus* (Perennial)**



***Celosia argentea* (Kharif)**



***Phyllanthus niruri* (Kharif)**



***Commelina benghalensis* (Kharif)**



***Vicia sativa* (Rabi)**



***Cyperus rotundus* (Perennial)**



***Cyperus difformis* (Kharif)**



***Fimbristylis miliacea* (Kharif)**

## IWM

- Majority (92%) of the research papers published on IWM in IJWS were on herbicide ó based IWM
- Only 8% of the paper were on non- chemical IWM
- As IWM takes into consideration the information on weed ecology and biology in managing weeds, they constitutes 14% of the total full length papers published in IJWS.



# Weed management methods



## **Preventive**

- **1).Use of clean seed**
- 2) Use well decomposed compost and F.Y.M.**
- 3) The cropped area, bunds irrigation channels, waste lands, public places etc. should be kept clean or free of weeds.**
- 4) Farm implements and machinery should be properly cleaned**

# Cultural method of weed control



- **Sowing time and spatial arrangement**
- **Use of seed rate**
- **Pre-sowing irrigation**
- **Crop rotation**
- **Mulching**
- **Residue management**
- **Varieties**
- **Intercropping**
- **Nutrient management**

# Mechanical methods



- **Seed bed preparation**
- **Hoeing**
- **Weeding through weeder and cultivators**

# Soybean



- Pre-plant incorporation of fluchloralin 1.0-1.5 kg/ha; vernolate 1.5-2.5 kg/ha;
- Pre-emergence acetachlor 1.25 kg/ha; Trifluralin 1.25 kg/ha; Alachlor 1.50 kg/ha (Kumar et al. 2008); clomazone 0.75-1.50 kg/ha, metriuzin 1.0-1.50 kg/ha, chlorimuron ethyl 4-8 g/ha, metolachlor 1.0-1.5 kg/ha, lactofen 1.0-1.5 kg/ha, oxyflurofen 0.5-1.0 kg/ha and imazethapyr 0.10-0.50 kg/ha; Pendimethalin 1.5 kg/ha.
- Post-emergence Haloxyfop-methyl 0.100 kg/ha; Quizolofop-ethyl 0.0625 kg/ha on 15 DAS (Kumar et al. 2008; Chander et al. 2013; 2014);



- Combinations of trifluralin and alachlor or triallate 1.0-1.5 kg/ha applied PPI or pre-emergence combination of pendimethalin 0.5-0.75 kg/ha and imazethapyr 0.100 kg/ha. Imazethapyr 75 g/ha (pre) *fb imazethapyr 75 g/ha (early post)*, quizalofop-ethyl 50 g/ha + chlorimuron-ethyl 4 g/ha (early post), pendimethalin 1.5 kg/ha (pre) *fb chlorimuron-ethyl 4 g/ha (early post)* (Chander et al. 2013; 2014)

# Rapeseed and Mustard



- Oxadiargyl 0.180 kg/ha, pendimethalin 1.50 kg/ha, trifluralin 1.50 kg/ha and postemergence application of isoproturon (IPU) 1.250 kg/ha alone; their half dose in integration with one hand weeding after one month and their half doses in integration with isoproturon 0.75 kg/ha (35 DAS), pendimethalin (pre) *fb* clodinafop (35 DAS) each at half the dose (Kumar et al 2012)
- Pre or post-emergence treatment with nitrofen (1.5-2.0 kg/ha) or fluorodifen (1.5-2.0 kg/ha) at 2-3 leaf stage; Fluchloralin 0.5-0.75 kg/ha as pre-plant incorporated; Isoproturon 0.75-1.0 kg/ha both as pre-plant incorporated or pre-emergence and oxadiazon 0.5-0.75 and pendimethalin 1.0 kg/ha as pre-emergence (Rana and Rana 2016)

# Groundnut



- Pre-plant incorporation of fluchloralin 1-2 kg/ha or nitralin 0.5-1.0 kg/ha or pendimethalin 1.0-1.50 kg/ha or pronamid 1.5-2.5 kg/ha or trifluralin 0.5-1.0 kg/ha or metolachlor 1.5-2.0 kg/ha or imazethapyr 50-70 g/ha. They will be effective only if rains or irrigation follow their application. Herbicides can be applied about 5 days before crop emergence.
- Pre-emergence application of pendimethalin (2 kg/ha) or alachlor 1.5-2.0 kg/ha or metolochlor (0.75-1.0 kg/ha) or butachlor (1.0 kg/ha) or nitrofen (2-4 kg/ha) or oxadiazon (1-2 kg/ha) or oxyflourfen 0.25-0.50 kg/ha or prometryn 0.5-1.0 kg/ha. A mixture of oxadiazon and dinoseb each at 1.7 kg/ha gives excellent control of weeds besides reducing stem rot in groundnut.
- Post-emergence application of fluazifop (0.125 – 0.250 kg/ha) 30-40 days after sowing groundnut against grasses especially *Cynodon dactylon*, imazethpyr [0.75 kg/ha](#) for control of mixed growth of grasses and BLW and quizalofop-ethyl 0.4-0.5 kg/ha for control of annual perennial grass weeds.

# Sesame



- alachlor 1.0 kg/ha or thiobencarb 2.0 kg/ha can be used as pre-emergence spray for effective control of weeds.
- Use of pre-herbicides followed by one hand weeding around 30 DAS is the most appropriate way of weed management in sesame.



# Sunflower



- Pre-plant incorporation of trifluralin 1 kg/ha or fluchloralin 1.0 1kg/ha to control grasses and broad leaved weeds.
- Pre-emergence application of pendimethalin (0.75-1.0 kg/ha), metolachlor 1.0 kg/ha, alachlor 1.0-2.0 kg/ha, oxyfluorfen 0.25 kg/ha and butachlor 1-1.5 kg/ha to control grasses and broadleaved weeds.
- Post-emergence application of fluazifop-P butyl 0.25 kg/ha 21- 25 DAS to control grasses.

# Linseed



- fluchloralin 1-1.50 kg/ha, pendimethalin 1.0-1.50 kg/ha or alachlor 1.0-1.50 kg/ha or isoproturon 1.0 kg/ha

# Safflower



- EPTC 2.0-3.0 kg/ha, trifluralin 1.50 kg/ha, nitralin 1.5-2.0 kg/ha and chlorpropham 3.5-4.5 kg/ha are pre-plant incorporated herbicides.
- Alachlor 1.5-2.0 kg/ha, metoxuron 2.5-3.0 kg/ha, fluchloralin 1.0-1.5 kg/ha and pendimethalin 0.75-1.0 kg/ha are effective pre-emergence herbicides.

# Castor



- Preplant incorporation of fluchloralin 0.75-1.5 kg/ha or trifluralin 0.75-1.0 kg/ha or neptalam 3.5-4.0 kg/ha and EPTC 2 kg/ha are effective in castor crop.
- Pre-emergence application of alachlor 1-1.5 kg/ha, nitrofen 1.0-1.5 kg/ha, metolachlor 1 kg/ha and pendimethalin 1.5 kg/ha are economical in irrigated castor.

# Oilseeds in general



| Herbicide     | Dose(kg/ha) | Time of Application |
|---------------|-------------|---------------------|
| Pendimethalin | 1 kg /ha    | Pre-emergence       |
| Alachlor      | 1.5-2       | Pre- emergence      |
| Trifluralin   | 1.5         | PPI                 |
| Isoproturon   | 1.25        | 35 DAS              |
| Imazethapyr   | 0.1         |                     |
| Metolachlor   | 1.0         |                     |
| Oxyfluorfen   | 0.1         | Pre-emergence       |



| <b>Herbicide</b>                      | <b>Dose<br/>(kg/ha)</b> | <b>Time of Application</b> |
|---------------------------------------|-------------------------|----------------------------|
| Isoproturon + HW                      | 0.6                     | 35 DAS+ 60 DAS             |
| Pendimethalin + HW                    | 0.75                    | Pre emergence + 30<br>DAS  |
| Clomazone + HW                        | 1.0                     | 30 DAS                     |
| Imazethapyr + quizalofop -<br>ethyl   | 0.1 + 0.075             | Post - emergence           |
| Pendimethalin+<br>interculturing+HW   | 1.0                     | 30 DAS                     |
| Metolachlor + HW                      | 1.0                     | 25 DAS                     |
| Oxyfluorfen + HW                      | 0.1                     | 25 DAS                     |
| Pendimethalin + mechanical<br>weeding | 1.0                     | 30 dAS                     |

# Future Research



- ❖ Assessments of On-farm losses caused by weeds
- ❖ On-farm assessment of available IWM options
- ❖ Weed ecology
- ❖ Interdisciplinary effort
- ❖ Need for Knowledge-based Decision-making tools.

# Conclusion

- Integrated weed Management is the best approach for combating weed problems
- The load of herbicides as well as detrimental effect of these chemicals can be avoided with the adoption of IWM
- Two or more weed control methods can be practiced for effective weed control
- In oilseeds cultural practices like crop rotation, dates of sowing, planting patterns, seed rates, methods of fertilizer application, etc. can be integrated with chemical or hand hoeing methods if needed.



- ❖ Herbicide can be used at low rates and can be integrated with hand hoeing or other methods
- ❖ The main problems with the use of herbicides i.e., resistance, shift in weed flora, soil persistence, etc. can be avoided with the adoption of IWM approach.

# References



- Kumar Suresh, NN Angiras, SS Rana and Arvind S Thakur. 2008. Evaluation of doses of some herbicides to manage weeds in soybean (*Glycine max* L.). *Indian J Weed Sci.* 40 (1&2): 56-61.
- Kumar Suresh, Ashwani Kumar, SS Rana, Navell Chander and NN Angiras. 2012. Integrated weed management in mustard. *Indian Journal of Weed Science* 44(3): 139-143.
- Chander Navell , Suresh Kumar, Ramesh and SS Rana. 2013. Nutrient removal by weeds and crops as affected by herbicide combinations in soybean – wheat cropping system. *Indian Journal of Weed Science* 45(2): 99-105.
- Chander Navell, Suresh Kumar, SS Rana and Ramesh 2014. Weed competition, yield attributes and yield in soybean (*Glycine max*) – wheat (*Triticum aestivum*) cropping system as affected by herbicides. *Indian Journal of Agronomy* 59(3): 377-384.
- Rana SS and MC Rana. 2016. Principles and Practices of Weed Management. Department of Agronomy, College of Agriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, 138 pages. (DOI: 10.13140/RG.2.2.33785.47207)