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WEEDS OF RICE IN SENAPATI DISTRICT AND THEIR SCIENTIFIC CONTROL

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MESSAGE

Weed problems in rice crop at Senapati District was one of the major concern from time immemorial. In the recent year, using of weedicide is increasing but due to the faulty used, resulted in environment pollution and residue in soil etc. Therefore, a proper understanding is needed while using weedicide. This bulletin covers the technical knowledge – how to used weedicide in rice crop, a major staple crops of Senapati District as well as the entire Manipur.

INTRODUCTION

Rice is grown as direct or transplanted method in Senapati district but due to weeds competition, the quality and yield of the crop reduced drastically. Weed competition is more severe in case of direct-seeded crop than from transplanted rice crop in the area. Annually, a value of Rs. 2000 crores loss due to weed problems which might varied from 20-50 percent depending on various condition of rice culture in India. However, it is also known that a loss caused by weeds exceeds the losses from any category of agricultural pests such as insects, nematodes, diseases, rodents, etc. Weeds compete with crop plants for nutrients, soil moisture and sunlight and directly have correlation in reducing crop yield and quality.

Rice mostly grown in rainfed condition and the spectrum and intensity of weeds after employing thorough puddle in both the condition (Direct seeded and transplanted) thrives better than the crop plants. Thus, manual removal of weeds by pulling is widely used as primarily depending upon the availability of lab our. But,

new flush of weeds seems to be established after 15-20 days of manual operation. Thus, enable the rice to established well and withstand the subsequent weed competition better. Moreover to this, manual operation is time consuming and difficult due to morphologically similarity between grass type weeds and the rice crop when both were in young stages.

As the total labour requirement for a single manual weeding range from 200- 250/man/day, nowadays farmers were turning to use chemical herbicide. As per record of 2007, the demand for herbicide in Manipur is increasing very rapidly to 40 tonnes annually for rice crop alone. This miraculous popularity of herbicide is due to the economy, time saving and less laborious. Even though chemical weed control is widely preferable, reports of environmental unsafe are coming up due to wrong selection of the chemical and stages of the weed plants, as well as overdose application.

Therefore, the user must have the following technical known how while using herbicide. Some of the photo plates of commonly found weeds of Senapati district are shown below as:-

A) Grass:



Echinochloa crusgalli



Echinochloa colonum



Aponogeton natans



Cynodon dactylon



Leersia hexandra



Setaria glauca

B) Sedges:



Cyperus iria



Cyperus rotundus



Cyperus difformis



Cyperus pilosus



Fimbristylis interupta



Scirpus mucronatus

C) Broadleaf:



Ludwigia parviflora



Monochoria vaginalis



Marsilea quadrifolia



Drymaria cordata



Commelina benghalesis

SELECTION OF HERBICIDE:

Depending upon the dominance of weeds and their stages in a particular field, the type of herbicide to be used will also differ. One's should select the herbicide which posses the activity to kills the target plant species in a mixed plant population without harming or only slightly affecting the other plants. Weedicide like Metsulfuron methyl,Bispyribac sodium, Pretilachlor, Pyrazosulfuron ethyl,benthiocarb,bentazole are found effective against broad range of weeds and can be applied when grown in more or less.

Lists of weedicide widely used in Manipur:

Chemical name	Trade name	Target weeds
Metsulfuron methyl	Move	<i>Cyperus rotendus</i> , <i>Ludwigia parviflora</i> , <i>Commelina benghalensis</i> , <i>Eclipta alba</i> , <i>Fimbristylis sp.</i> , <i>Sphenoclea</i> , <i>Casulia axillaris</i>
Metsulfuron methyl + Chlorimuron ethyl	Almix	<i>Echinochloa spp.</i> , <i>Cyperus spp.</i> , <i>Ludwigia parviflora</i> , <i>Eclipta alba</i> , <i>Fimbristylis sp.</i> , <i>Sphenoclea</i> , <i>Monochoria vaginalis</i> , <i>Marsilea spp.</i> , <i>Sagittaria spp.</i> , <i>Bergia spp.</i>
Paraquat dichloride	Diquat	<i>Argeratum conizides</i> , <i>Commelina benghalensis</i> , <i>Echinochloa crusgalli</i> , <i>Panicum</i>

		<i>repens</i> , <i>Cyperus iria</i> , <i>Brachiaria mutica</i> , <i>Marsilea quadrifoliata</i> , <i>Mallugo spargulla</i>
Oxyfluorfen	Goal	<i>Echinochloa sp.</i> , <i>C. iria</i> , <i>C. difformis</i> , <i>Fimbristylis miliacea</i> , <i>Eclipta alba</i> , <i>Marsella spp.</i>
Pretilachlor	Delete, Refit	<i>C. difformis</i> , <i>C. iria</i> , <i>E. crusgalli</i> , <i>E. colonum</i> , <i>Eclipta alba</i> , <i>Fimbristylis miliacea</i> , <i>Ludwigia purviflora</i> , <i>Panicum repens</i> , <i>Leptochloa chinensis</i>
2,4-D ethyl ester	Weednash, weedmar, Knock weed, Agrodan, Anuweed, Champion	<i>E. colonus</i> , <i>Cyperus rotundus</i> , <i>Eclipta alba</i>
Fenoxaprop- P-ethyl	Whip super	<i>Echinochloa crusgalli</i> , <i>E. colona</i>
Cyhalofop- Butyl	Clincher	<i>Echinochloa species</i>
Pyrazosulfuron ethyl	Sathi	<i>Cypersus sp.</i> , <i>Echinochloa sp.</i> , <i>Fimbristylis miliacea</i>
Butachlor	Punch, Machete	<i>Echinochloa spp.</i> , <i>Cypersus spp.</i> , <i>Setaria glauca</i> , <i>Digitaria sanguinalis</i> , <i>Panicum spp.</i>
Pendimethalin	Storm	<i>Echinochloa spp.</i> , <i>Setaria glauca</i> , <i>Panicum dichotomiflorum</i> , <i>Digitaria spp.</i> <i>Brachiaria spp.</i>
Bispyribac sodium	Nominee- gold	<i>Echinochloa spp.</i> , <i>Ischaemum rugosum</i> , <i>Cypersus spp.</i> , <i>Eclipta alba</i> , <i>Fimbristylis sp.</i> , <i>Scirpus mucronatus</i> , <i>Marsilea quadrifolia</i> , <i>Sagettaria sagittifolia</i> , <i>Monochoria vaginalis</i> ,

		<i>Ludwigia spp. Sphenoclea zeylanica</i>
Orthosulfamuron	Kelion	<i>Echinochloa spp., Cyperus spp., Commelina benghalensis, Eclipta alba, Fimbristylis sp., Aponogeton natans, Setaria glauca, Scirpus mucronatus, Monochoria vaginalis, Sagittaria sagittifolia, Alternanthera sessilis, Marsilea quadrifolia, Jussia repens</i>

The user always keep in mind that weedicide which is selective at a lower rate of dose may become non-selective when applied at higher rate of dose. In weedicide like 2,4-D ethyl ester lower dose may not able to kill weeds to desire and may cause malformation of rice plant too. Usually most of the farmers use higher dose of weedicides which are undesirable and this lead to unsafe of environment as well as uneconomic.

The recommended doses of some of the commonly used weedicide are given below:

Chemical name	Dose hectare ⁻¹	Formulation (%)	Chemical name	Dose hectare ⁻¹	Formulation (%)
Metsulfuron methyl	4 gm a.i.	20 WP	Butachlor	1.5 kg a.i.	50 EC

Metsulfuron methyl + Chlorimuron ethyl	3.2 gm a.i.	20 WP	Anilofos	0.2 -0.4 kg a.i.	30 EC
Paraquat dichloride	0.30-0.80 gm a.i.	24 SL	Benthioca rb	1- 1.5 kg a.i.	50 EC
Fluchloralin	0.56-0.80 gm a.i.	45 EC	Pendimet halin	1.0-1.5 kg a.i.	30 EC
Oxyfluorfen	1.5 kg a.i.	23.5 EC	Bispyribac sodium	160 ml a.i.	10 SC
Pretilachlor	5-7.5 kg a.i.	50 EC	Orthosulf amuron	1.5 kg a.i.	50 WG
2,4-D ethyl ester	1-1.5kg a.i.	38 EC, 35 EC, 20 WP & 18 WP	Pyrazosulf uron ethyl	200 gm a.i.	10 WP
Fenoxaprop- P-ethyl	56.25 gm a.i.	9 EC	Cyhalofop - Butyl	0.1 kg a.i.	10 EC

Calculation of weedicide requirement:

Weedicide were available in different trade names with varying concentration of active ingredient (a.i.) for which,

weedicides are usually recommended. The amount of weedicides required may be calculated as follows:

$$\text{Amount of weedicide (kg)} = \frac{\text{Recommended dose (kg a.i./ha)} \times \text{Area (ha)} \times 100}{\text{Concentration of the product (\%)}}$$

Example: i) Calculate the amount of metsulfuron methyl 20 WP (trade name is move) required for 1 sangam (1/4 ha) area at the recommended dose of 0.4 kg a.i./ ha.

$$\begin{aligned} \text{Amount of metsulfuron methyl required} &= \frac{4 \times 0.25 \times 100}{20} \\ &= 0.5 \text{ litre} \end{aligned}$$

ii) Calculate the amount of 2,4-D ethyl ester 38 % EC (trade name is weednash) required for 1 sangam (1/4 ha) area at the recommended dose of 1kg a.i./ ha.

$$\begin{aligned} \text{Amount of 2,4-D ethyl ester 38 \% EC required} &= \frac{1 \times 0.25 \times 100}{38} \\ &= 0.65 \text{ litre} \end{aligned}$$

iii) Calculate the amount of Pyrazosulfuron ethyl 10 % WP (trade name is sathi) required for 1 sangam (1/4 ha) area at the recommended dose of 0.01kg a.i./ ha.

$$\begin{aligned} \text{Amount of Pyrazosulfuron ethyl 10 \% WP required} &= \frac{0.01 \times 0.25 \times 100}{10} \\ &= 0.025 \text{ litre} \end{aligned}$$

Time of application:

Since the rice crop is planted mostly in rainfed condition, one's should always note first the stages and condition of weeds as well as the condition of field and stages of crop. Several types of weedicides were available in Manipur under several trade names of same chemicals. These weedicides have their own limit to control the weeds of rice crop. Lists of some of the weedicides with time of application and their mode of action were mentioned below:

Chemical name	Time to applied	Mode of action
Metsulfuron methyl	3- 35 DAT/DAS	Inhibit cell division in shoots and roots of the weed
Metsulfuron methyl + Chlorimuron ethyl	5-35 DAT	Inhibit cell division in shoots and roots of the weed
Paraquat dichloride	Blanket spray (Pre ploughing or one week before sowing)	Damage cell membranes and cytoplasm during photosynthesis by producing superoxide or absorbs by foliage

		with some translocation in xylem
2,4-D ethyl ester	5 – 35 DAT/DAS	Absorb by roots and translocate throughout the weed plant
Fenoxaprop- P-ethyl	3-7 DAT or 1-3 DAT	Acetyl CoA carboxylase (ACCase) inhibitor
Cyhalofop- Butyl	16-18 DAT/DAS	Acetyl CoA carboxylase (ACCase) inhibitor
Pyrazosulfuron ethyl	3-7 DAT or 1-3 DAS	-
Benthiocarb		Inhibitor of lipid synthesis
Pendimethalin	1-10 DAS/DAT	Microtubule assembly inhibitor
Bispyribac sodium	7- 30 DAT	Acetolactate synthase (ALS) inhibitor, also called Acetohydroxyacid synthase (AHAS) inhibitor, blocks branched chain amino acid biosynthesis

The effectiveness of a weedicide may be reduced drastically when they are applied at wrong time. Depending upon the mode of

action, weedicides were classified as pre- and post- emergence. Pre-emergence weedicide should be applied just before rice sowing or transplanting or 3-5 days after sowing or transplanting. But the weedicide like Paraquat dichloride which is non selective to plants should be spray as blanket spray just before pre-ploughing. If not, this chemical can destroy our crop too. Post-emergence weedicide is effective when applied after 15-20 days of planting or sowing just weeds start emergence to the stages that weeds possess upto 5 leaf. If the weeds plant become olds (more than 6 leaf), the effectiveness of weedicide is reduce.

MODE OF APPLICATION

Generally, weedicide are applied in the form of solution or granules. For solution application, weedicide were formulated in the form of wettable powders, soluble powders and emulsifiable and solution concentrate. The solution has to apply with the help of sprayers. As per weedicide formulation, dose of weedicide is also differing. While spraying any weedicide, used only flat jet or flood jet nozzle type for more effective and more coverage of weeds. Weedicide like 2,4-D ethyl ester 18 % WP and 38 % EC, Metsulfuron

methyl 20% WP, Fenoxaprop-P-ethyl 9.3% w/w EC needs scanty water to field for more coverage and effective but some of the weedicide like bipyribac sodium needs to removed water from field just before 24 hrs. of spraying. After 12 hrs. of spraying, paddy field has to flush water again for 3-5 cm depth and make it remain for a week for more effective. Granules weedicide has to applied with hand or applicator after thoroughly mixing of weedicide with some other particles like sand, fertilizers, ash, dry soil powder, paddy hull or saw dust. This type of weedicide need experienced worker for uniformly broadcast which afterward to enhance weed control efficacy.

Precaution:

1. Used only required quantity of weedicide which are not expired and with proper labels.
2. Person engaged in herbicide sprayed should always wear rubber gloves, rubber boots, hat, goggles, mask and coat for covering the body.
3. While spraying weedicide, nozzle must be always at downward direction and keep as low as to reach the weeds.

4. Weedicide container after used has to dispose by burying in barren field to a sufficient depth.
5. Always spray at morning (just after drying of dew) or evening hours.
6. Do not spray before or after rain.
7. Avoid spraying during strong sunshine and windy days.
8. While spraying, do not stand against wind direction.
9. Avoid drinking, chewing or smoking while spraying weedicide.
10. In case of poisoning through swallowing, inhalation or absorption through the skin, the affected person should be given medical attention immediately.
11. After spraying of weedicide wash all the clothes wear during spray, took bath with body soap and wash sprayer thoroughly with detergent.
12. Always keep sprayer and weedicide out of reach of food, feed, kitchen items, live stocks and children.