CHAPTER VI

SUMMARY AND CONCLUSION

Field experiments were conducted during rabi seasons of 2005-06 and 2006-07 at Tanjore and Kanchipuram in TamilNadu, and Trichur and Alleppy in Kerala to study the effect of seed rate and weed management practices in direct seeded rice under wet condition.

The experiment was laid out in split plot design with three replications. The main plot treatments comprised of different seed rates viz., 80, 100 and 120 kg ha⁻¹. The subplot treatments included the weed management practices, untreated weedy check, hand weeding twice at 25 and 45 DAS, cyhalofop butyl @ 100 g a.i ha⁻¹ at 15 DAS, bensulfuron methyl @ 60 g a.i ha⁻¹ at 20 DAS, cyhalofop butyl @ 100 g a.i ha⁻¹ at 15 DAS fb bensulfuron methyl @ 60 g a.i ha⁻¹ at 20 DAS, cyhalofop butyl @ 100 g a.i ha⁻¹ at 15 DAS fb hand weeding, bensulfuron methyl @ 60 g a.i ha⁻¹ at 20 DAS fb hand weeding and cyhalofop butyl @ 100 g a.i ha⁻¹ at 15 DAS fb bensulfuron methyl @ 60 g a.i ha⁻¹ at 20 DAS fb hand weeding.

The major weed flora of the experimental fields at Tanjore, Kanchipuram, Trichur and Alleppy were *Echinochloa colomum, E. crusgalli* and *E. stagnina* among grasses, *Bergia capensis, Monochoria vaginalis, Sphaeranthus indicus, Ludwigia parviflora* and *Lindernia procumbens* among broadleaved weeds and *Cyperus difformis* and *Fimbristylos miliaceae* among sedges.

Among the three different seed rates, 100 and 120 kg ha⁻¹ efficiently smothered the weeds and thus lowered the weed density significantly. The crop establishment at early stage was good with the above seed rates which were found optimum to smother the weeds and reduce their competition for space, light and nutrients. This resulted in reducing dry weight of weeds at the above seed rates. The higher weed control efficiency was obtained at 120 kg ha⁻¹ seed rate.

Among the weed management practices, the ability to control specific weed groups was observed. Cyhalofop butyl @ 100 g a.i ha⁻¹ at 15 DAS effectively controlled the *Echinochloa spp* whereas, bensulfuron methyl @ 60 g a.i ha⁻¹ at 20 DAS controlled broadleaved and sedge weed efficiently. The sequential application of these two herbicides
gave total weed control and there by reduced the weed density present in the experimental fields. The integration of hand weeding with this herbicide schedule further reduced the late emerging weeds. The chemical weed control practice was comparable with the hand weeding twice at 25 and 45 DAS. The three weed management practices, cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8), hand weeding twice at 25 and 45 DAS (S2) and cyhalofop butyl fb bensulfuron methyl (S5) recorded higher weed control efficiency and was found effective.

The plant height was not significantly influenced by seed rates. Only at Alleppy the plant height was found maximum in 100 and 120 kg ha\textsuperscript{-1} seed rates at flowering and maturity.

Consistently maximum plant height was observed in the weed management practice cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8) and this was followed by cyhalofop butyl fb bensulfuron methyl (S5). The heavy weed infestation in untreated weedy check (S1), severely affected the plant height.

Optimum plant population ensured by 100 and 120 kg ha\textsuperscript{-1} seed rates resulted in increased tiller production when compared with the lower seed rate 80 kg ha\textsuperscript{-1}. The weed management practices, hand weeding twice at 25 and 45 DAS (S2), cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8) and cyhalofop butyl fb bensulfuron methyl (S5) ensured the maximum tiller production by reducing the weed competition during critical weed competition period. The combination of these three weed management practices with above two seed rates resulted in higher tiller production.

The dry matter production of the rice crop from seedling to maturity stage was higher in 100 and 120 kg ha\textsuperscript{-1} seed rates. During seedling to tillering stage the tiller production was maximum in cyhalofop butyl fb bensulfuron methyl (S5) and cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8). At later stage hand weeding twice at 25 and 45 DAS (S2) was also comparable with the above two weed management practices.

The seed rate was found significant for CGR at flowering to maturity stage only where 120 kg ha\textsuperscript{-1} seed rate recorded maximum CGR. The weed management practices played a significant role in CGR at all the stages and hand weeding twice at 25 and 45 DAS (S2), cyhalofop butyl fb bensulfuron methyl (S5) and cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8) resulted in maximum CGR.
The panicles m\(^{-2}\) was significantly influenced by the seed rates and it was found that 100 and 120 kg ha\(^{-1}\) seed rates produced maximum number of panicles m\(^{-2}\). Among the weed management practices, hand weeding twice at 25 and 45 DAS (S2), cyhalofop butyl \(fb\) bensulfuron methyl (S5) and cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8) recorded higher panicles m\(^{-2}\). The lowest number of panicles m\(^{-2}\) was recorded in untreated weedy check (S1). The combination of 100 and 120 kg ha\(^{-1}\) seed rates and weed management practices, hand weeding twice at 25 and 45 DAS (S2), cyhalofop butyl \(fb\) bensulfuron methyl (S5) and cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8) produced more number of panicles m\(^{-2}\).

Seed rate did not play any significant role on 1000 grain weight. It was lower in untreated weedy check (S1). But there was no significant difference among other weed management practices.

In general, panicle length was not influenced by seed rate. Maximum panicle length was recorded in 100 kg ha\(^{-1}\) seed rate at Kanchipuram and Trichur in first year. The panicle length was influenced by weed management practices and the lengthier panicles were found in hand weeding twice at 25 and 45 DAS (S2), cyhalofop butyl \(fb\) bensulfuron methyl (S5) and cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8).

The higher grain and straw yield was achieved by 100 and 120 kg ha\(^{-1}\) seed rates which were comparable. Among the weed management practices, cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8), hand weeding twice at 25 and 45 DAS (S2) and cyhalofop butyl \(fb\) bensulfuron methyl (S5) recorded maximum grain and straw yield. The combination of 100 and 120 kg ha\(^{-1}\) seed rates and weed management practices, hand weeding twice at 25 and 45 DAS (S2), cyhalofop butyl \(fb\) bensulfuron methyl (S5) and cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8) recorded higher grain yield at Trichur and Alleppy in first year.

The highest weed index was recorded in untreated weedy check (S1) where the yield loss was more due to high weed competition. The weed management practice, cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8) recorded the lowest value for weed index which recorded the maximum grain yield.

High net return was achieved with 100 kg ha\(^{-1}\) seed rate. The weed management practice, cyhalofop butyl \(fb\) bensulfuron methyl \(fb\) hand weeding (S8) recorded highest net
return across all the locations. This was followed by cyhalofop butyl fb bensulfuron methyl (S5) and hand weeding twice at 25 and 45 DAS (S2).

The test verification of the effective treatments in larger plots were conducted at eight locations two each in Tanjore, Kanchipuram, Trichur and Alleppy during rabi 2007-08. The trial results revealed cyhalofop butyl fb bensulfuron methyl (S5) and cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8) were comparable with hand weeding twice at 25 and 45 DAS (S2) at 100 kg ha\(^{-1}\) seed rate. The effective treatments (S5 and S8) recorded the higher grain and straw yield over untreated weedy check (S1).

The bioassay of residual green gram after the harvest of main crop showed that the herbicides cyhalofop butyl and bensulfuron methyl were safe to the succeeding green gram without affecting its growth and grain yield.

**Technology recommendation for adoption**

- In direct seeded rice under wet condition for TamilNadu and Kerala 100 kg ha\(^{-1}\) seed rate shall be recommended to achieve higher grain yield.
- Among the weed management cyhalofop butyl @ 100 g a.i ha\(^{-1}\) at 15 DAS fb bensulfuron methyl @ 60 g a.i ha\(^{-1}\) at 20 DAS shall be employed with or without one hand weeding at 45 DAS to control the weeds during critical weed competition period further by its integration of hand weeding ensures reducing the late emerging weeds.
- To achieve the highest net return in direct seeded rice under wet condition 100 kg ha\(^{-1}\) seed rate coupled with the weed management practice cyhalofop butyl fb bensulfuron methyl fb hand weeding (S8) can be adopted, without any residual effect on the succeeding green gram.