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Research Article

# Weed Dynamics in Various Cultivars of Rice (*Oryza sativa L.*) under Direct Seeding and Transplanting Conditions in Lamjung

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## Abstract

Even though rice is a major crop of Nepal, its' productivity seems very low in South Asia due to high infestation of weeds. Therefore, a field research was conducted in the field of Lamjung Campus, Sundarbazar from July-October, 2015. Two Factorial Randomized Complete Block Design under direct seeding (DSR) and transplanted (TPR) cultivations with weeded and non-weeded check for diverse rice cultivars (US-382, Sukha-2, NR-10676, NR-10490 and Khumal-10) as treatments was executed in field with 3 replications. Statistical results indicated that *Rotataindica, Fimbristylis miliacea, Ageratum conyzoides, Cyperusiria, Polygonum barbatum and Cynadon dactylon* were found as the major weeds under both DSR and TPR whereas *Paspalum distichum* L., *Alternanthera sessiles* L., *Echinochloa colona* L., *Digitaria*sp., *Amischophacelus axillaris* L., *Echinochloa crusgalli* L. were minor. *Rotataindica* was found the major weed in TPR. It was seemed that the highest weed population recorded for US-382(131.7/$m^2$),when cultivated under TPR system but it was completely absent under DSR. Meanwhile *Cynadon dactylon* was completely absent in weeded region of TPR system, which in contrary was the highest in weeded field of DSR with variety US-382(18.7/$m^2$). Similar results were found in case of biomass for varieties consisting higher number of weeds while it was lowest in weeded field of NR-10490 shown as TPR. Highest grain yield was obtain from the weeded region of US-382(7.7 t/ha) of TPR system whereas lowest yield was found in varieties NR-10490 and NR-10676 (1.8 t/ha) of non-weeded region of DSR system. With the increase in biomass of weed the yield of rice decrease gradually with co-relation, $y = -0.0119x + (R^2 = 0.1251)$. Hence, without effective weed control management we can't increase the productivity of rice.

**Keywords:** DSR; Rice cultivars; TPR; Weed dynamics

## Introduction

Those plants which usually grow where they are not wanted, and usually, interfere with the production of cultivated crops are considered to be weeds (Ranjit and Bhattarai, 1988). Weeds are often defined as 'plants out of place', but this only considers the human view of a weed, not the fact that weeds are plants, which are ecologically in place, they are growing in an environment provided or managed by man which suits their needs. Weeds possess special plasticity in growth, which allows adaptation to varying conditions and very fast growth rates that give them advantages over crop (FAO, 1987). Weeds reduce the crop yield either by reducing the amount of harvestable product (grain, Stover, forage) or by reducing the amount of crop actually harvested (Aldrich, 1984). The energy expended for the weeding of man's crops is sometimes more than for any other single human task (Holm, 1971).The variegated geo-physical conditions in Nepal have created a hospitable environment for diversely adapted weed- flora. There is a chronic problem of loss in crop yield due to weeds in agricultural land. The long persisting menace of weeds has still remained in spite of several revolutionary breakthroughs in modern weed-control science and technology. Under the existing farming and gardening system, which in most of the cases are tradition bound, the various factors that cause serious infestation of weeds are half-hearted or neglected approach towards weed control. Prevalence of mono-culture system thus facilitating vigorous multiplication and perennation of weeds, lack of provision for scientific cropping pattern, fragmentation of holding, use of input materials unrestrictedly contained with weed seeds and so on (Regmi, 1999).

Nowadays, rice cultivation is done in different ways in the world. The most important cultivation ways are direct seeded and transplanting methods. Direct seeding of rice (DSR) refers to the process of establishing a rice crop from seeds sown in the field rather than by transplanting rice (TPR) seedlings from the nursery. There are three principal methods of DSR: dry seeding (sowing dry seeds into dry soil), wet seeding (sowing pre-germinated seeds on wet puddle soils) and water seeding (seeds sown into standing water). Dry seeding has been the principal method of rice establishment since the 1950s in developing countries (Pandey and Velasco, 2005). At present, rice cultivation is as direct seeded in America, Western Europe such as Italy and French, Russia, Japan, Cuba, India, Korea, and the Philippines and in some parts of Iran, due to high technology, high labor cost and shortage of skilled labor (Akhgari, 2004). In northeastern Thailand and many other rice growing areas in Asia, conventional TPR has been replaced by dry seed broadcasting (DSR), mainly because of the higher cost of TPR and a shortage of the labor required (Dawe, 2005; Naklang, 1997; Pandey *et al*., 2002; Tuong *et al*., 2005). The final rice cultivation system in the world is affected by water deficient, low suitable land, and shortages of worker (Nguyen and Ferrero, 2006). At present, 23% of rice is direct-seeded globally (Rao *et al*., 2007). In the United States, Australia and Europe, rice is planted into either a dry-seeded or water-seeded system (Gianessi *et al*., 2002; Ntanos, 2001; Pratley *et al*., 2004). In Australia for instance, most rice is aerially sown in water (Pratley *et al*., 2004), while in Africa, broadcasting and dibbling are common seeding practices for rice sowing (Ampong- Nyarko, 1996). Labor saving of DSR method induced by preparation of nursery and TPR, causes the reduction of 11.2% in total production cost. DSR methods have several advantages over TPR (Singh *et al*., 2005). In addition to higher economic returns, DSR crops are faster and easier to plant, less labor intensive and consume less water (Jehangir *et al*., 2005; Khade *et al*., 1993; Santhi *et al*., 1998; Balasubramanian and Hill, 2002; Pandey and Velasco, 1999). DSR has received much attention because of its low-input demand (Farooq *et al*., 2011). The development of early-maturing varieties and improved nutrient management techniques along with increased availability of chemical weed control methods has encouraged many farmers in the Philippines, Malaysia, Thailand and India to switch from TPR to DSR culture (Farooq *et al*., 2011). The cost of rice worker is two to three times of the other field crop production. It is important to note that the reduction of worker is necessary for rice production. Thus, it is necessary to change the cultivation system from TPR to DSR. In DSR method such as wet bed, seeds are cultivated as distribution, linear and hill. Also, crop management such as weeds management, water management, production cost, the number of labor, yield potential of varieties and seedling establishment method are assessed. Rice cultivation system in the main world areas in response to major world economic and technological factors is changing in the fields. One of the major changes is TPR to DSR method. For extension of the method, there is need for early maturity of rice varieties and better chemical technology for weed control in rice fields (IRRI, 1991; Do Kim *et al*., 2012; Pandey *et al*., 2002; Akhgari, 2004). Basically, trend to DSR and TPR depends on the region and the type of dominant ecosystem. The use of TPR method for increasing the yield became customary. Nowadays, production cost has been decreased using DSR. Weather, economical and society conditions are effective factors for this dominant (Do Kim *et al*., 2012). Yield in DSR is often lower than TPR principally owing to poor crop stand and high weed infestation (Singh *et al*., 2005). Moreover, cost for weed control is usually higher than TPR. High weed infestation is a major constraint for broader adoption of DSR (Rao *et al*., 2007). Therefore, assessment of varieties with high yield potential is one of the research requirements (Do Kim *et al*., 2012). Efforts to improve grain yield under drought conditions through breeding are continuing (Cooper *et al*., 1999b; Jongdee, 2001), but progress is limited, mainly because of the large genotype-environment interaction (Cooper and Somrith, 1997; Wade *et al*., 1999; Cooper *et al*., 1999a). Extensive researches in Rural Development Administrate (RDA) showed that no significant differences was shown between DSR and TPR methods or even between two methods of direct seeded. Based on the researches, the future progress in increasing of the yield of irrigated rice in DSR will be highly more than TPR, and this value will reach to 10 to 15 tons/ha (IRRI, 1991).

In case of Nepal most of the farmers prefer TPR in low land because of availability of water but in upland they follow DSR which depends upon rainfall water. Among the various factor responsible for the lower production of rice, weed infestation has become one of the important one. The productivity of rice in Nepal is very low i.e. 2.71t/ha (MOAC, 2009). The lower productivity is due to the lack of scientific knowledge on weed management, suitable planting method and selection of varieties.

As most of the rice cultivation in the mid hill is being done in rain fed condition, farmers follow DSR methods. The problem of weed competition with rice is of great economic importance in the country because it causes a 10–35% reduction in grain yield. Large amount of money is spent annually on weed management practices. The shift in methods of rice culture from transplanting to direct seeding has magnified the weed problem. The problem of weedy rice is particularly acute in the direct-seeding rice areas.

Similarly, Nepal is diversified in agro climatic condition (tropical, sub-tropical, temperate, alpine and sub-alpine) which support the larger amount of weed species. Improper tillage, contaminated seed, un-rotten FYM is the main cause of weed infestation in case of our country. Still we practice hand weeding for weed management, which is very costly and tedious job also complete elimination of weed is not possible through this method.

There stands a huge gap between the productivity of the research station and farmers field in our context. There are a several technological and socio-economic barriers in the cause. For higher sustained yield and food security, lowering the damage caused by the weed will be a great important. Apart from that,it is estimated that every year, weeds cause yield losses from 15 to 76% in rice crop (Singh *et al*., 2004, Mondal *et al*., 2005, Rao and Nagamani 2010, Mishra *et al*., 2012, Mandal *et al*., 2013). Direct yield loss has been estimated to the range from 16- 86% depending on type of rice culture, cultivars, weed species and density, cropping season, plant spacing, fertilizer rate, duration and time of weed infestation and climatic and environmental conditions (Duary *et al*., 2004, Kolay 2007).

For these reasons, more emphasis must be given to tillage operation, weed management practices, fertilizer management, and irrigation facilities. To increase the production, weeds in the field must be control by applying any suitable weed control methods. This study will eventually help in identifying the weed species in rice field in TPR and DSR condition in the mid hills of Nepal.

## Materials and Methods

### *Experimental Site*

The study was conducted in Western Nepal in Lamjung district ,Sundarbazzar municipality at Lamjung campus field in amalgamation with NARC. The site is located at an elevation of 800 m with the latitude of 28º7'to 28º10'N and longitude of 84º24' to 84˚28'E (Fig 1).

### *Design of Experiment*

The experiment was conducted in two factors Randomized Complete Block Design with three replication and 20 treatment combination. The treatment was consists the combination of following two factors:Factor A: Planting methods(P) + Weed management(W), A1: Weeded + DSR, A2: Non-Weeded + DSR, A3: Weeded + TPR, A4: Non-Weeded + TPR. Factor B: Varieties/ pipeline varieties: V1: US-382, V2: Sukha-2, V3: NR-10490, V4: NR-10676, V5: Khumal-10. For direct seeded practices, planting field should be started from first plowing in lengthwise of the field. The second plowing in crosswise should be done 15-30 days after with hand weeding at the same time. Rice seeds should be sown or broadcasted uniformly on the plots at the rate of 80kg/ha. Soil should be plowed to incorporate rice seed under it. The moisture will accelerate seed germination. If the seeds incorporated too deep under the soil, at heavy rain, the seed would not evenly germinate and rot. Seed sowing was done for DSR on 23$^{rd}$ June 2015.

For Transplanted Practice, Nursery bed was established in the agronomy farm of IAAS lamjung campus sundarbazar. The seedbed should be prepared by starting from first plowing in lengthwise of the field. The second plowing in crosswise should be done 7-10 days after. Water should be applied into the field subsequently after plowing to flood the muddy soil, then harrowing and puddling processes. The prepared land should be partitioned into small seedbeds, 1-2 m. wide with the length along the field. A small furrow of 30 cm. wide is set between seedbeds for water drainage. Rice seeds are sown uniformly on the seedbeds at the rate of 50-70 gm. per sq. m. The seedbed is maintained at saturated moisture for seed germination by draining out the flooding water. After the emergence of seedling, gradually increase the water level of the seedbeds according to the height of the seedling, but not exceeds 5 cm. from the soil surface. The seed rate used for each variety was 50 kg/ha. Nursery bed of about 1m$^2$ was made. Seedbed was prepared for TPR on 23$^{rd}$ June 2015. Land preparation depends upon the soil and its moisture content. The selected land for rice transplanting was flooded before transplanting to saturate it with water. At the day of transplanting, the land was ploughed with tractor and indigenous plough 2 times. The field was then puddled by ploughing the land with standing water so as to create an impervious layer below the surface to reduce deep percolation losses of water and to provide soft seed bed for planting rice. The field, after being puddled, was leveled with the help of rake and spade. Each experimental plot was prepared for transplanting after application of basal dose chemical fertilizer.

The fertilizer was applied in recommended dose of 60:30:20 NPK Kg/ha NPK. Whereas nitrogen was applied in 3 split doses, 50% of nitrogen with all dose of P and K applied as basal dose during transplanting. Remaining 50% of nitrogen was applied in 2 split dose during first and second weeding. For basal application, the recommended rate of fertilizer may be split into twice, on the planting date and rice tillering stage. Top dress fertilizer means the fertilizer applies at panicle initiation stage of rice plant. Application of organic fertilizer every year induces the accumulation in the soil and reduces the requirement of chemical fertilizer in the following year. So, heavy application of organic fertilizer acceleratesthe reduction of chemical use.


**Fig. 1**: Location map of Lamjung district showing experimental site

Weeding is one of the important operations, which are necessary for better establishment of crop and yield. The experimental plots were hand weeded twice.

- 1st weeding: 25 DAT (2070/4/14)
- 2nd weeding: 50 DAT (2070/5/7)

The uprooted weeds were buried in the field itself outside the experimental plots. Gap filling was also done during 1$^{st}$ weeding in the empty spots.

Generally transplanted rice (TPR) plots were kept continuously flooded, to maintain a 5-8 cm depth of water during the entire growth period. Water is necessary for rice plantation and affects the yield. During seedling stage, rice plants need less water so it is not necessary to flood the field. At tillering stage (about 20 to 30 days after seed germination in wet or dry seeded rice or 30 days after transplanting). Dry soil surface always enhance weed growth and becomes competitors of rice plants. It is advised to maintain water level at 5 to 10 cm. from the soil surface to control weeds. At maximum tillering stage, water level should be maintained at higher level to prevent emerging of new nonproductive tillers. In order to get a uniform ripening grain, it is suggested to drain off the water from the field 20 days after flowering date or 10 days before harvesting.

Harvesting was done in *Ashoj* for direct seeded and in Kartik for transplanted. The net plot of area 3 m$^2$ was harvested. After harvesting it was left one day in field for drying. Threshing was carried out manually with the help of thresher as well as by locally adopted method of threshing.

Observation taken on Weed Density, Weed Dry biomass, Grain yield and all data obtain from the research field was analyzed using Microsoft-excel, IBM SPSS 21 and GEM stat 2003

## Result and Discussion

***Effect of Different Parameters on Treatments***

From the Table 1, the different treatments selected in the experiment showed the highly significant result in weed biomass. The Factor A2 (DSR+ non-weeded) has highest weed biomass and followed by Factor A4 (TPR+ non - weeded) and lowest weed biomass was found in A3 Factors. Factor A2 has high weed biomass because there is no weed control and there is no water level to suppress the weed species. The A3 factor has lowest weed biomass because there is weed control and has water level to suppress the weed species. Biomass of weed has no significant result on Varieties.

The grain yield of rice also show significant result in different treatments, high grain yield was obtain from factor A3 which was followed by A4 and least grain yield was obtained from A2.Grain yield of rice has significant result on rice cultivars, highest grain yield was obtain from V1(US-382) which is statically at par with khumal-10.

Weed number in different treatment also show the significant result, highest weed number was recorded on factor A4 and least weed number was recorded from A1. Weed number also shows significant result on rice cultivars, highest weed number was obtain from Sukha-2.The lowest number of weed was counted from US-382.Wilson *et al*. (1995) reported that increased rice density not only reduced weed biomass but also reduced number and dry weight of weed seeds.

From the Table 2, the interaction between Factor A and Factor B shows highly significant result on weed biomass. Highest dry weed biomass was obtain from A2 V1 (DSR+ Non-Weeded + US-382) and lowest weed biomass was recorded from A3V5 (TPR+ Weeded + Khumal-10). The highest weed biomass was obtain from A2V1, this is due to non-weeded pot and US 382 is a hybrid varieties of rice and it requires more water to suppress the weed growth but in DSR the water is not enough to suppress the weeds.

**Table 1**: Effect of different parameters on treatments

| Treatments | Weed biomass g / $m^2$ | Weed number No. | Yield (t /ha) |
|---|---|---|---|
| **Planting method + Weed management** | | | |
| A1 (DSR+ weeded) | 59.71[c] | 103.13[d] | 2.23[c] |
| A2 (DSR+ non weeded) | 172.98[a] | 181.00[b] | 1.97[d] |
| A3 (TPR +weeded) | 38.61[d] | 125.67[c] | 6.84[a] |
| A4 (TPR + non weeded) | 131.96[b] | 189.47[a] | 5.48[b] |
| Significant | ** | ** | ** |
| SEM ± | 3.26 | 2.20 | 0.15 |
| C.D. at 5% | **9.33** | **6.31** | **0.43** |
| **Cultivars** | | | |
| V1 (US 382) | 102.64 | 123.25[d] | 4.73a |
| V2 (Sukha-2) | 106.30 | 193.17[a] | 3.78[b] |
| V3 (NR 10676) | 96.96 | 132.75[cd] | 3.74[b] |
| V4 (NR 10490) | 96.45 | 163.25[b] | 3.96[b] |
| V5 (Khumal-10) | 101.72 | 136.67[c] | 4.45[ab] |
| Significant | NS | ** | ** |
| SEM ± | 3.64 | 2.46 | 0.17 |
| C.D. at 5% | 10.43 | 7.05 | 0.48 |
| CV | 12.52 | 5.70 | 13.16 |

**Table 2**: Interaction between Factor A (cultivars) and Factor B (planting methods + weed management) on weed biomass

| Treatments | A1 (DSR+ weeded) | A2 (DSR + non-weeded) | A3 (TPR + weeded) | A4 (TPR + non-weeded) |
|---|---|---|---|---|
| V1 (US 382) | 65.6 | 245.6 | 19.3 | 80.0 |
| V2 (Sukhha-2) | 46.5 | 220.1 | 67.5 | 91.1 |
| V3 (NR 10676) | 55.0 | 104.0 | 40.0 | 188.8 |
| V4 (NR 10490) | 62.2 | 138.6 | 53.7 | 131.3 |
| V5 (Khumal-10) | 69.1 | 156.6 | **12.5** | 168.6 |
| A x B | ** | | | |
| SEM | 7.28 | | | |
| C.D. at 5% | 20.86 | | | |
| C.V. (%) | 12.52 | | | |

From Table 3, interaction between Factor A and Factor B shows highly significant result on weed number. Highest weed density was recorded from A2 V5 (DSR, Non-Weeded + Khumal-10). Lowest Weed number was recorded from A1 V5 (DSR, Weeded +Khumal-10). The high and low weed density was found in same variety of different treatments. This is due the small crop canopy of Khumal-10

***Co-Relation between Weed Biomass and Grain Yield***

Fig. 4 shows the co-relation between weed biomass and grain yield. Increase in weed biomass has negative effect on grain yield, increase in the biomass of weed there is decreasing pattern on grain yield. These two parameters show inverse relation. Some researchers reported that weed biomass decreased and grain yield increased as crop density increased (Eslami *et al*., 2006; Olsen and Weiner, 2005).

**Table 3**: Interaction between cultivars and (planting methods +Weed management) for weed number

| Treatments | A1 (DSR+ weeded) | A2 (DSR + non-weeded) | A3 (TPR +weeded) | A4 (TPR + non-weeded) |
|---|---|---|---|---|
| V1 (US 382) | 120.0 | 144.0 | 84.7 | 144.3 |
| V2 (Sukhha-2) | 143.3 | 184.7 | 216.0 | 228.7 |
| V3 (NR 10676) | 74.7 | 152.3 | 116.3 | 187.7 |
| V4 (NR 10490) | 117.3 | 150.7 | 116.3 | 268.7 |
| V5 (Khumal-10) | **60.3** | 273.3 | 95.0 | 118.0 |
| A x B | ** | | | |
| SEM | 4.93 | | | |
| C.D. at 5% | 14.11 | | | |
| C.V. (%) | 5.70 | | | |

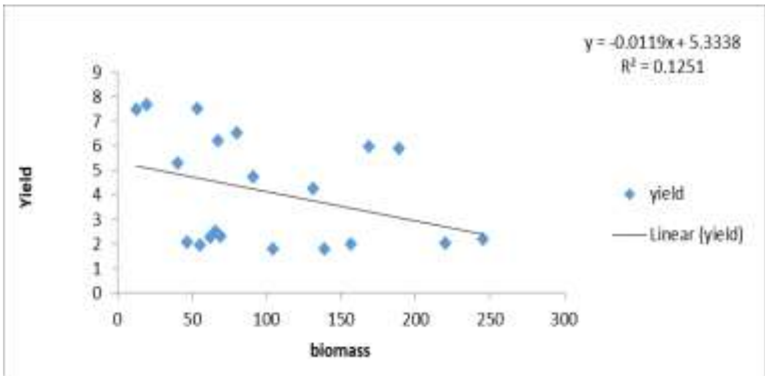


**Fig4:** Co-relation between weed biomass and grain yield

**Table 4**: Interaction between cultivars and (planting methods +Weed management) for yield

| Treatments | A1 (DSR + weeded) | A2 (DSR + non-weeded) | A3 (TPR + weeded) | A4 (TPR + non-weeded) |
|---|---|---|---|---|
| V1 (US -382) | 2.5d | 2.2 | $7.7^{a}$ | $6.5^{b}$ |
| V2 (Sukhha-2) | 2.1 | 2.1 | $6.2^{bc}$ | $4.8^{c}$ |
| V3 (NR 10676) | 2.0 | **1.8** | $5.3^{bc}$ | $5.9^{bc}$ |
| V4 (NR 10490) | 2.3 | **1.8** | $7.5^{ab}$ | $4.3^{cd}$ |
| V5 (Khumal-10) | 2.3 | 2.0 | $7.5^{ab}$ | $6.0^{bc}$ |
| A x B | ** | | | |
| SEM | 0.33 | | | |
| C.D. at 5% | 0.95 | | | |
| C.V. (%) | 13.96 | | | |

From the Table 4, interaction between Factor A and Factor B shows highly significant result on grain yield. High grain yield was recorded from TPR of weeded plot and the variety was hybrid rice US-382. These high yield of US-382 is due to large crop canopy, high tillering, high fertilizer sensitive, less shattering effect etc. Similarly low grain yield was obtained from different cultivars NR-10676 and NR-10490 of DSR non-weeded plot. The lower production of these two cultivars is due to the small crop canopy, which allows the high weed growth, which ultimately promote insect and different diseases and high shattering.

***Weed Species Found in the Rice Field***

From the Table 5, the major weed found in the field were Belautijhar (*Rotata indica*), Jwanejhar (*Fimbristylis miliacea*), Mothejhar (*Cyperus iria*), Pirlejhar (*Polygonum barbatum*), Gandhe (*Ageratum conyzoides*) and Dubo (*Cynadon dactylon*).Similar result was obtain by Holm *et al*. (1977)

All species of weed shows highly significant result on Factor A (planting method and weed management) and Factor B (Cultivars) as well as interaction between two factors. Belautijhar (*Rotata indica*) was dominant weed of transplanting rice of non-weeded plot, this is due to submerse loving nature of this weed. Sukha-2 show highly significant result for this weed. Jwanejhar (*Fimbristylis miliacea*) was the dominant weed of DSR non-weeded plot, similarly this weed was found in higher amount in V4 (NR 10490) and least amount in V1 (US 382). Mothejhar (*Cyperus iria*) was also dominant weed of DSR non-weeded condition, similarly this weed was found in higher amount in V1 (US-382) and least amount in V5 (Khumal-10). Pirlejhar (*Polygonum barbatum*) was dominated weed of TPR non-weeded plot, it was also found in higher number in V2 (Sukhha-2) and statically at par with V5 (Khumal-10) and lowest number in V4 (NR 10490). Gandhe (*Ageratum conyzoides*) is also a major weed of rice which was found in higher number in A2 (DSR+ non-weeded), it was dominate in (NR 10490) and statically at par with V5 (Khumal-10) and was found least V2 (Sukhha-2). At last, Dubo (*Cynadon dactylon*) was also dominated in DSR of non-weeded plot, the cultivar which support highest number of this weed was V3 (NR 10676).

**Table 5**: Weed species (number/m$^2$)

| Treatment | Belautijhar (*Rotata indica*) | Jwanejhar (*F. miliacea*) | Mothejhar (*C. iria*) | Pirlejhar (*P. barbatum*) | Gandhe (*A. conyzoides*) | Dubo (*C. dactylon*) |
|---|---|---|---|---|---|---|
| **(Planting methods + Weed management)** | | | | | | |
| A1 (DSR+ weeded) | 0.00 | 10.73$^b$ | 21.87$^b$ | 7.73$^d$ | 19.33$^b$ | 8.13$^{ab}$ |
| A2(DSR+ non-weeded) | 3.47$^b$ | 45.80$^a$ | 27.73$^a$ | 15.20$^b$ | 25.47$^a$ | 8.20$^a$ |
| A3 (TPR +weeded) | 71.80$^{ab}$ | 4.27$^c$ | 8.40$^c$ | 9.53$^c$ | 0.27$^d$ | 0.53$^b$ |
| A4(TPR + non-weeded) | 74.60$^a$ | 44.00$^{ab}$ | 7.93$^c$ | 17.13$^a$ | 2.13$^c$ | 1.33$^b$ |
| Significant | ** | ** | ** | ** | ** | ** |
| SEm± | 1.15 | 0.98 | 0.79 | 0.55 | 0.60 | 0.34 |
| C.D. at 5% | 3.30 | 2.82 | 2.27 | 1.57 | 1.71 | 0.97 |
| **Cultivars** | | | | | | |
| V1 (US-382) | 40.75c | 7.17d | 24.50a | 11.00c | 9.67bc | 5.25b |
| V2 (Sukhha-2) | 51.75a | 25.17c | 20.67b | 15.25a | 5.42c | 2.75cd |
| V3 (NR 10676) | 18.50e | 30.25b | 20.25bc | 12.58b | 10.75b | 6.67a |
| V4 (NR 10490) | 47.17b | 35.42a | 10.58c | 8.50d | 17.25a | 4.75bc |
| V5 (Khumal-10) | 29.17d | 33.00ab | 6.42d | 14.67ab | 15.92ab | 3.33c |
| Significant | ** | ** | ** | ** | ** | ** |
| SEM | 1.29 | 1.10 | 0.88 | 0.61 | 0.67 | 0.38 |
| C.D. at 5% | 3.69 | 3.15 | 2.53 | 1.76 | 1.91 | 1.08 |
| A × B | ** | ** | ** | ** | ** | ** |
| C.V. (%) | 11.92 | 14.55 | 18.6 | 17.14 | 19.57 | 28.75 |

## Summary and Conclusion

The research was conducted during June 2015 to October 2015 in Lamjung campus field which lies in Sundarbazar municipality to see the weed dynamics in various cultivars of rice (*oryza sativa* l.) under direct seeding and transplanting conditions in kharif season.

Weeded plot perform better production over non weeded plot. Higher grain yield was obtain from, TPR+ weeded +US 382. The major weed found in the field were *Rotataindica*, *Fimbristylis miliacea*, *Ageratum conyzoides*, *Cyperusiria*, *Polygonum barbatum and Cynadon dactylon* were found as the major weeds under both DSR and TPR whereas *Paspalum distichum* L., *Alternanthera sessiles* L., *Echinochloa colona* (L.), *Digitaria* sp., *Amischophacelus axillaris* (L.), *Echinochloa crusgalli* (L.) were minor. *Rotata indica* was found the major weed in TPR whereas *Fimbristylis miliacea)* was major weed of DSR.

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