

江原道 農村振興院. 安明勳, 金起植, 韓世基, 許範亮  
建國大學校. 金光鎬

### Effects of Sowing Method, Sowing Date and Sowing Rate on Rice Grain Yield in Direct Sowing System Using Transplanting Machine.

\*Kang Weon P.R.D.A. M.H.Ahn, K.S.Kim, S.K.Han, B.L.Huh,  
Kon Kuk University. K.H.Kim

#### (實驗目的)

直播栽培에서 問題點으로 提起되는 倒伏과 鳥類被害 防止를 爲하여 既存에 普及되어 있는 移秧機를 利用하여 澆水 土中直播의 播種方法和 北部 平野地에서의 播種適期 및 播種량을 究明하고자함.

#### (材料 및 方法)

1986년부터 1988년까지 3年間 江原道 農村振興院(春川) 水稻園場에서 實施하였으며, 供試品種을 천마벼로 하여 粒毛率 向上, 播種期, 播種量試驗으로 區分하여 隨行하였다.

播種은 既存에 普及되어 있는 移秧機를 利用하기 爲하여 散播用 育苗箱子에 흙을 근족狀態로 하여 播種 覆土하고 1日程度 陰乾하여서 箱子만을 除去하고 흙 狀態로 移秧機에 搭載 本畝에 澆水 土中直播하였다

#### (實驗結果 및 考察)

1. 발육 및 논흙을 床土로 하여 育苗箱子에 播種한後 移秧機를 利用한 澆水 土中直播가 可能하였으며, 1mm 程度 催芽하여 播種하고 簡單澆水로 물관리를 하는 것이 粒毛率이 높았다.
2. 立毛率은 4月 30日과 5月 10日 播種區에서 높았으며, 立毛率이 70%以上되는 播種限界 溫度는 日平均氣溫 14.8°C, 日平均地溫 16.3°C 였다.
3. 出穗期는 播種이 10日 늦어짐에 따라 2 - 3日 遲延되었으며, 同一播種期에서는 直播栽培가 손移秧보다 出穗期가 4日 늦었고 機械移秧보다는 1日 빨리 出穗하였다.
4. 穗數는 손移秧이나 機械移秧에 비하여 直播栽培에서 더 많았고 立毛率이 높았던 4月 30日 播種區와 箱子當 200g 播種區에서 많았다.
5. 收量으로 본 適正播種期는 5月上旬으로 推定되었고, 收量性은 481kg/10a으로 손移秧 機械移秧과 같은 水準이었으며, 適正播種量은 箱子當 200g 으로 10a 當 6kg 程度로 推定된다.
6. 澆水 土中直播時 收量을 增大시킬 수 있는 重要한 要因은 立毛率을 높여 單位 面積當 穗數와 粒數를 增加시키는 것이었다.

Table 1. Emergence date and percentage of established plants according to direct sowing methods in submerged paddy.

| Treatment No. | Soil type                     | Seed treatment |               | Sowing date              | Emergence date | Percentage of Establishment |
|---------------|-------------------------------|----------------|---------------|--------------------------|----------------|-----------------------------|
|               |                               | Soaking        | Sprouting     |                          |                |                             |
| DSM-1         | Upland soil (clay cont 10.2%) | soaking        | non-sprout    | one day after harrowing  | May 12         | 56.7***                     |
| -2            | Paddy soil (clay cont 13.4%)  | "              | "             | "                        | May 13         | 54.2*                       |
| -3            | "                             | "              | Sprouting 1 m | "                        | May 9          | 74.4*                       |
| -4            | "                             | non-soaking    | non-sprout    | "                        | May 14         | 64.9*                       |
| -5            | "                             | soaking        | sprouting 1 m | two days after harrowing | May 9          | 80.4*                       |

\* DSM: Direct sowing method.

\*\* Means within a column followed by the same letters are not significantly different by Duncan's test at the 5% level.

Table 3. Heading date and accumulated temperature until heading according to sowing dates with different transplanting methods.

| Item                                  | Direct sowing |           |         |         |        |
|---------------------------------------|---------------|-----------|---------|---------|--------|
|                                       | Hand T        | Machine T | Apr. 20 | Apr. 30 | May 10 |
| Heading date                          | 7.29          | 8.3       | 8.2     | 8.4     | 8.7    |
| Days for heading                      | 105           | 105       | 104     | 96      | 89     |
| Accumulated temperature until heading | 2,106         | 2,163     | 2,136   | 2,059   | 1,980  |

Hand.T: Hand transplanting

Machine.T: Machine transplanting

Table 6. Exquisite workability of conditions after sowing according to sowing rates per box

| Sowing rate (g/box) | No. of sowing per hill | Percentage of vacant hill | Percentage of plant establishment |
|---------------------|------------------------|---------------------------|-----------------------------------|
| 130                 | 3.0                    | 6.0                       | 59.6                              |
| 200                 | 5.4                    | 1.9                       | 78.5                              |
| 260                 | 7.8                    | 0                         | 81.0                              |

Table 7. Growth and grain yield according to sowing rates per box

| Sowing rate (g/box) | Heading date | No. of panicles per hill | No. of panicles per m <sup>2</sup> | No. of grains per head | No. of grains per m <sup>2</sup> | Ripened grains (%) | Wt. of 1000 grains (g) | Milled rice yield (t/10a) |
|---------------------|--------------|--------------------------|------------------------------------|------------------------|----------------------------------|--------------------|------------------------|---------------------------|
| 130                 | Aug. 5       | 18.3                     | 295                                | 90.5                   | 26,497                           | 85.2               | 29.9                   | 416                       |
| 200                 | Aug. 5       | 15.8                     | 344                                | 91.5                   | 31,476                           | 85.2               | 20.8                   | 452                       |
| 260                 | Aug. 5       | 15.9                     | 358                                | 91.0                   | 32,469                           | 85.4               | 20.7                   | 442                       |
| LSD(5%) NS*         |              | 1.5                      | 80                                 | NS                     | 6,923                            | NS                 | NS                     | 40                        |

\* NS: Not significant

Table 2. Emergence and establishment of rice plants according to sowing dates

| Item                        | Apr. 20 |      |      | Apr. 30 |      |      | May 10 |      |      |      |      |      |
|-----------------------------|---------|------|------|---------|------|------|--------|------|------|------|------|------|
|                             | '86     | '87  | '88  | Mean    | '86  | '87  | '88    | Mean | '86  | '87  | '88  | Mean |
| Emergence date              | 5.7     | 5.7  | 5.4  | 5.6     | 5.1  | 5.10 | 5.11   | 5.11 | 5.2  | 5.18 | 5.14 | 5.19 |
| Days for emergence          | 17      | 17   | 14   | 16      | 11   | 11   | 10     | 11   | 11   | 10   | 8    | 9    |
| Percentage of Establishment | 40.1    | 36.5 | 41.4 | 39.3    | 81.6 | 78.0 | 84.2   | 81.3 | 40.4 | 78.6 | 81.2 | 81.7 |

Table 1. Yield and yield components according to direct sowing dates with different transplanting methods.

| Treatments   | No. of panicles per m <sup>2</sup> | No. of grains per m <sup>2</sup> | Wt. of 1,000 grains (g) | Milled rice yield (t/10a) | grain / straw weight |
|--------------|------------------------------------|----------------------------------|-------------------------|---------------------------|----------------------|
| D.S* Apr. 20 | 245 <sup>b</sup> **                | 23,422 <sup>b</sup>              | 85.4 <sup>ab</sup>      | 21.2 <sup>a</sup>         | 476 <sup>b</sup>     |
| D.S Apr. 30  | 388 <sup>a</sup>                   | 31,571 <sup>a</sup>              | 85.2 <sup>ab</sup>      | 21.5 <sup>a</sup>         | 452 <sup>a</sup>     |
| D.S May 10   | 346 <sup>ab</sup>                  | 31,694 <sup>a</sup>              | 83.5 <sup>b</sup>       | 21.2 <sup>a</sup>         | 464 <sup>a</sup>     |
| Hand T.      | 338 <sup>ab</sup>                  | 32,851 <sup>a</sup>              | 85.9 <sup>a</sup>       | 21.6 <sup>a</sup>         | 481 <sup>a</sup>     |
| Machine T.   | 365 <sup>a</sup>                   | 32,741 <sup>a</sup>              | 85.5 <sup>a</sup>       | 21.2 <sup>a</sup>         | 488 <sup>a</sup>     |

\* D.S.: Direct sowing

Hand T.: Hand transplanting

Machine T.: Machine transplanting

\*\* Means within a column followed by the same letters are not significantly different by Duncan's test at the 5% level.