INFLUENCE OF STRAW ASHES ON WEED CONTROL EFFECT OF HERICIDES IN RICE[1]

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The interest of rice farmers in controlling weeds with herbicides instead of traditional hand weeding has been greatly increased in recent years. As a result, the acreage of transplanted rice controlled with herbicides has increased very rapidly from only 485 ha in 1966 (Chang, 1969) to 15,838 ha in 1970 (Chang, 1971) and 123,496 ha in 1972. It is of practical importance, therefore, that herbicides now commercially available (Lin, 1971) should be carefully applied to insure a good control of weeds in rice. Inasmuch as weed control effect of herbicides can be affected by various environmental factors, an understanding on the influence of these related factors appears necessary. This experiment was designed to investigate the influence of straw ashes on weed control effect of certain herbicides in rice.

MATERIALS AND METHODS

The experiment was conducted on the clay pots in the screenhouse of the Chiayi Agricultural Experiment Station in the first crop of 1972. The variables included two applications of straw ashes and five herbicides. Two applications of straw ashes were with and without straw ashes. The treatment with straw ashes was applied with 7 grams of straw ashes per pot of 250 cm^2 or 250 grams of straw ashes per m^2. The ratio of rice straw to straw ashes was about 9 to 1. Straw ashes were mixed thoroughly with soil under submerged condition before planting weed seeds. Five granular herbicides used in this experiment were TOK, MO—401, Machete, Saturn, and non application of herbicide. The herbicides were applied at the rate of 30 kg per ha of formulated product as recommended (PDAF, 1972). Seeds of *Echinochloa crusgalli*, *Monochoria vaginalis*, and *Cyperus difformis* were sown at the rate of 0.2, 0.1, and 0.1 grams per pot or 8, 4, and 4 grams per m^2, respectively. Herbicides were applied 7 days after sowing of weed seeds. The 2×5 factorial experiment was laid out in a randomized complete block design with two replications. The influence of straw ashes on weed control effect of herbicides was expressed by weed count which was made at 70 days after the application of herbicides.

RESULTS AND DISCUSSION

The number of weeds per pot recorded for herbicides with and without straw ashes is presented in Table 1. It was observed that the number of weeds per pot in treatments with and without straw ashes differed slighty for non—herbicides control and Machete

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(Figure 1) but more weeds survived in the pots applied with straw ashes in comparison with those without straw ashes for herbicides Saturn, TOK, and MO 401 (Figures 2,3, and 4, respectively). The result clearly demonstrates that the incorporation of straw ashes into paddy soil could lead to the reduction of weed control effect of certain granular herbicides currently in commercial use in Taiwan. The exact reason of poor performance for certain herbicides in soil applied with straw ashes is, however, not clearly understood. The finding that straw ashes in paddy soil reduced the effect of herbicides in rice might be of practical importance in Taiwan since it is a common practice for rice farmers to burn rice straw and stubbles after the harvest of rice. It appears, therefore, necessary that herbicides not sensitive to straw ashes should be used or the application rate of herbicides sensitive to straw ashes should be increased if good control of weeds is to be obtained in rice field incorporated with straw ashes before transplanting of rice.

The application of straw ashes greatly reduced the initial control of weeds as indicated by more weeds of primary infestation in the treatment applied with straw ashes (Table 1.) However, difference in the number of secondary infested weeds between treatments of with and without straw ashes was relatively small, indicating that the residual effect of herbicides was not greatly affected. Among major weeds of rice, the control of *Echinochloa crusgalli* appeared most greatly affected by the application of straw ashes which was followed by *Cyperus difformis* but *Monochoria vaginalis* was not affected. Thus, incorporation of straw ashes in rice field heavily infested with *Echinochloa crusgalli* anpd *Cyperus difformis* is likely to cause considerable reduction in the weed control effect of herbicides sensitive to straw ashes such as TOK and MO—401.

Although the effect of certain herbicides could be affected by straw ashes, the critical amount of straw ashes to become harmful is not presently clear. In this experiment, 2,500 kg per ha of straw ashes was incorporated into soil. This amount was nearly five times larger than that could be obtained from the burning of rice straw and stubbles left in a paddy field after harvest. Some farmers apply only part of harvested straw for the purpose of burning rice stubbles. In this case, the amount of obtainable straw ashes may become smaller. Therefore, it appears unlikely that occasional burning of straw and stubbles would produce sufficient amount of straw ashes to cause significant reduction in the weed control effect of herbicides sensitive to straw ashes. However, repeated burning of rice straw and stubbles may hasten the accumulation of straw ashes in a paddy field to reach a critical point some day. Further investigation on this matter appears worthwhile.

SUMMARY

The influence of straw ashes on the weed control effect of some granular herbicides in rice was evaluated at the Chiayi Agricultural Experiment Station in the first crop of 1972. The incorporation of straw ashes into paddy soil reduced considerably the weed control effect of Saturn, TOK,and MO—401 but not that of Machete. The application of straw ashes affected primarily the initial weed control effect but not the residual effect of herbicides sensitive to straw ashes. The control of *Echinochloa crusgalli* was most severely

affected by straw ashes which was followed by *Cyperus difformis* but *Monochoria vaginalis* was not affected.

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Table 1. Number of weeds per pot counted at 70 days after sowing of weed seeds.

Herbicide	Straw ashes	*Echinochloa crusgalli*		*Monochoria vaginalis*		*Cyperus difformis*		Total	
		Primary infestation	Secondary infestation	Primary infestation	Secondary infestation	Primary infestation	Secondary infestation	Primary infestation	Secondary infestation
Control	With	33	18	—	—	12	25	45	43
	Without	24	23	—	—	13	305	37	328
Machete	With	1	1	—	—	—	—	1	1
	Without	4	1	13	20	—	—	21	38
Saturn	With	8	2	—	—	6	18	14	20
	Without	—	2	4	9	—	—	4	11
TOK	With	22	8	—	—	—	8	22	16
	Without	2	7	—	—	—	—	2	7
MO—401	With	24	13	—	—	—	3	24	16
	Without	2	4	—	—	—	—	2	4

without ashes with ashes
Figure 1. Weed control effect of Machete with and without straw ashes.

without ashes with ashes
Figure 2. Weed control effect of Saturn with and without straw ashes.

with ashes without ashes
Figure 3. Weed control effect of TOK with and without straw ashes.

without ashes with ashes
Figure 4. Weed control effect of MO—401 with and without straw ashes.

稻草灰對若干稻田殺草劑藥效之影響[1]

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摘 要

嘉義農業試驗分所於民國61年第1期作觀察稻草灰之施用，對若干推廣中稻田殺草劑治草效果之影響。初步結果顯示稻田施用稻草灰可減低掃丹、多谷、益歐—401等殺草劑之藥效，但馬上除之治草效果則極受影響。稻草灰以減低殺草劑初期治草效果爲主，對殺草劑之殘效作用影響較少。主要雜草中稗草之防治最受稻草灰施用之影響，三角草次之，而鴨舌草則未受影響。

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