

ROTATIONAL CROPPING INTRODUCING TAMA RYEGRASS RENGE, (*ASTRAGALUS SINICUS*), PUMPKIN (*CUCURBITA MOSCHATA VAR TECNUS*) AND HORSE BEAN (*VICIA FABIA*) IN PADDY FIELD

T.I. Kawase

Director Kawase Grassland Research Institute, Hon member of Japanese Scientific Society of Grassland
Q.S.O., Dr. Agric. Sci..(H.U.) Dip. C.A.C.(N.Z.)

ABSTRACT

The author was successful in introducing Tama Rye grass mixed with Renge by surface sowing just after the harvest of rice in paddy fields (in dried up condition). The grasses were cut 3-4 cm long, spread between young plants of rice after transplanting and the paddy field filled with water. Then the grasses covered well for depressing weed growth and contributed as green manures.

The author was also successful in introducing grasses in rice fields and producing pumpkin or corn then horse beans in paddy fields after they dried up. This rotational cropping of grass -rice- corn or pumpkin and horse beans in paddy fields is named Kawase's Rotational Cropping.

KEYWORDS

Paddy field, Tama rye grass, Renge, Rice, Corn or Pumpkin, Horse bean

PRESENTATION

Farming in Japan is very different from other countries' large scale farming. The average size of holding of Japanese farmers is only 1.2 ha. So Japanese agriculture involves more horticultural tendencies. Our rice cropping in paddy fields is carried on in a more manual way, though we are introducing small size machinery at the present time.

In Japan, spring is moderate and warm, but in summer it is very hot. We have temperatures of over 30½C for a little over a month, as we are blessed with sunshine and on the other hand we have a Tsuyu season of wet-days for a little over a month. Under such circumstances many kinds of weeds come out in the paddy fields, so weeds in paddy fields are the enemies of farmers.

Another different point of Japanese farming compared to the European style of farming is that we haven't utilized domestic animals as much.

Dr. T.I. Kawase, an agronomist of grassland farming, who studied in New Zealand tried introducing grasses with legumes in paddy fields after the harvesting of rice in autumn without irrigation. The climate in autumn is blessed with moderate temperatures and in winter time it is not extremely cold, except in Hokkaido.

The reporter was successful with surface sowing (i.e. sowing without cultivation), grasses and legumes in the fields after the harvesting of rice in the paddy fields in the middle of October. When it is supplied with plenty of manure or fertilizers worth nearly 40 kg of Nitrogen and phosphate per 10a, and with half the amount of potassium it is enough to produce over ten tons of grass yield.

In this case, the reporter used Tama rye grass (*Lolium multiflorum*, Polyploid, a New Zealand production) with Renge (a Japanese production, *Astragalus sinicus*), as it can stand better in wet soil than clover.

Those grasses cut at the middle or at the end of May were then spread between rice in the paddy fields. A week or ten days after the transplanting of young rice plants, the grass is cut into 3-4 cm lengths.

Concerning the weight of grasses being enough to prevent weeds coming up in the paddy fields, it was made clear after several years of trials that, between 2,800 kg to about 3,500 kg per 10a are required. Also it was found that about 8 to 9 kg of nitrogen is provided by grasses as they decompose and even more by legume plants. Renge and Soramame (Horse bean) give nearly 6-8 kg of nitrogen to the soil by the fixation of

nitrogen. So in total over 10 kg of nitrogen is supplied to rice cropping; that is enough to produce 600 kg of rice per 10a. Also enough potassium is supplied by grasses but not enough phosphate so it is necessary to supply about several more kg of phosphate to the soil.

After the harvest of grasses at the end of May or early in June the fields are cultivated and the seed of Pumpkin (*Cucurbita moschata*, Duchesne) were sown in the middle of June. Then in the middle or end of August, we can get the harvest of the pumpkins. Usually we can get about 600 fruits, with a total weight of 1 ton per 10a. The field is cultivated again. Then in the middle of October it is time to sow the seeds of Horse bean (*Vicia faba* L.); that is the period of 20½C temperatures.

The flowering time of Horse beans is a week or ten days later, after cherry blossoms bloom in Japan. But they can withstand the coldness of winter time and can be ready for the harvest of shells and beans at the end of May.

Then the fields are cultivated and after water is supplied through irrigation channels we then can prepare the soil for transplanting of young plants of rice.

Usually the yields of horse beans is over three thousand shells per 10a; each shell contains 4 to 17-18 beans which are used for food purposes in Japan.

As it is described here, we can expect the harvest of horse beans at the end of May. It is the busiest time for farmers involved in transplanting young rice plants, so it is said among Japanese farmers, it is the time needed for the help even of the hands of cats. In addition rain-fall, which is called Tsuyu, begins from early or middle June so it is necessary to finish the farm-work before Tsuyu begins.

Under such circumstances if we can get the time to sow corn after the harvest of horse beans, until the end of May, then it is not necessary to sow pumpkins, because corn is more profitable than pumpkin. In another way, it may be a good idea to sow corn on one farm and pumpkin on others.

At this time an agricultural specialist whose name is Mr. T. Kakiyama with four helpers from the Fukuoka Experimental Institute invented a machine which can dig a thin and narrow trench in the soil and sow the seed of corn and cover it with soil. It is named the Surface Sowing Corn Machine. It appeared in the magazine of Grassland Science, Vol.42 No. 1 1996, but I haven't seen this machine yet. But when we can use this machine it is very convenient for us.

As I have described here, I was successful in introducing grasses with legumes in paddy fields without irrigation. Then followed rice cropping with plenty of water supplied through irrigation channels; then pumpkins or corn and then horse-beans after the paddy field had dried, and the grasses spread between young plants of rice (after transplanting) to be utilized for weed control and green manure.

This rotational cropping is named Kawase's Rotational Cropping introducing pasture grasses and legumes in paddy fields using pumpkins or corn, then horse beans.

At the end of this essay if you kindly permit me to give a few words more, it is reported that the rice produced by this rotation is more tasty than the rice which is produced using chemical fertilizers.

