Piloting a system of crop intensification

The System of Rice Intensification (SRI) was developed in Madagascar to improve yields through transplanting young seedlings at a wide spacing and enhancing the fertility of the soil with compost. This system of crop management has been extended to other crops, particularly wheat and finger millet in India. This is referred to as a System of Crop Intensification (SCI). In 2009, ISD provided background training and support for model farmers in Tahtai Maichew (Tigray), Ambassel, Tuledere, Wogedi and Mekdela, South Wollo (Amhara), and Gembichu (Oromia) to test the impact of using a 'system of crop intensification' (SCI) based on:

- Raising seedlings, transplanting at a young age with wide spacing, and providing women and children with simple hand-operated tools to assist in weeding
- Monitoring the crop growth in both normal farmers' practice and SCI plots through photos, dialogue with farmers, and at harvest, collecting the weights of grain, 1000-grain weight, and straw

The data are still being collected and will be analysed and written up separately. However, results from each of the 3 areas show the following:

Tahtai Maichew

The training for the farmers took place in the first week of June 2009. Despite the fact that the rainy season was poor (it started late and stopped early in the first week of September), 7 farmers grew **wheat** with new methods on 6, 2 and 1 m^2 plots. The number of tillers per plant ranged from 4-37 (average 4-5 in normal fields), seeds per spike 60-65 (average <40 in normal fields), and grain yield was 29-100 q/ha equivalent. Three farmers grew **finger millet** on areas of 6, 192 and 625 m^2 with grains yields of 24-32 q/ha, and 1 farmer grew **sorghum** on 36 m^2 giving a yield of 16 kg or 44 q/ha equivalent.

South Wollo

Farmers from the four woredas (Tehulledere, Ambasel, Wogide and Meqdela) were trained in late June and 14 participated in this pilot experiment. Seeds of 4 types of cereal crops (**maize, sorghum, wheat, finger millet**) were sown in nurseries in each participating kebele. They were transplanted after 10-15 days from nursery to plots ranging in size from 2 x 2 m to 6 x 8 m. The grain and straw yields are given in Table 1. The amount of fertilizer used was the recommended rate by soil type and crop. Compost was used for **maize** and **finger millet** with the rate of 100-200 quintal per hectare. **Sorghum** was grown without any input. Because the orientation for the SCI pilot experiment was given very late, farmers compared transplanting with direct sowing.

TABLE 1: Average crop yields per plot and in kg/ha for four transplanted and direct seeded crops by 14 farmers in South Wollo Zone in 2009

		Average yield kg/ha				No. of fingers /tillers/plant			No. of grains/ finger-tiller			Spike length/cm		
		per plot		per/hectare										
Type of crop	**Input used**	**Grain**	**Straw**	**Grain**	**Straw**	**Min**	**max**	**Av**	**Min**	**max**	**Av**	**Min**	**max**	**Av**
Wheat transplant	DAP & urea	0.67-2.0	2.2	4,200-5,000	5,560	18	22	20	40	60	50	30	40	35
Wheat Direct	DAP & urea			3,500										
Maize transplant	Compost	4.6	7.8	2,900	4,870	6	2	4	120	150	135	40	60	50
Maize Direct	DAP & urea			2,500-3,500										
Sorghum transplant	None	0.96	1.96	1,600	3,260	8	2	5	100	140	120	30	46	38
Sorghum direct	DAP & urea			1,400-2,700										
Finger millet transplant	Compost	6.75	10.7	2,800	4,460	17	14	15	20	40	30	7	5	6
Finger millet direct	DAP & urea			2,800-2,900										

Result and Discussion

Compared to the productivity from direct sowing, transplanting gave similar or higher yield

In Wogide, transplanted **wheat** using chemical fertilizer by two farmers produced 42 and 50 q/ha equivalent. Tillers averaged 20 /plant (18-22) and the number of grains per spike also increased to an average of 50.

The impact of compost in Ambassel woreda for transplanted **finger millet** increased grain and straw yield for all four farmers with an average of 28 q/ha of grain and 44.6 q/ha of straw.

In Meqdella woreda, use of compost with **maize** gave a similar grain and straw yield to that from use of chemical fertilizer. The space between plants was increased from 25 to 30 cm and between rows from 25 to 50 cm. These changes were made because the farmers considered the recommended spacing was not enough. Transplanted **sorghum** without any input produced 16 q/ha, similar to that for sorghum grown with chemical fertilizer. The farmer increased the spacing for sorghum to 30 cm between plants and 75 cm between rows.

The transplanted cereal crops not only increased in productively of grain and straw but also they were easier to work for weeding and control of pests, and at harvesting time. Direct sowing with rows is labour-intensive so transplanting system was an easier system. The transplanted cereal crops were more productive with the use of inputs (compost or chemical fertilizers) with recommended amount.

Gembichu

Gimbichu Woreda is in Eastern Oromiya Zone, north east of Addis Ababa. The Woreda has 33 kebeles. The farmers grow mostly pulses and cereals. Wheat and lentil cover most of the agricultural area together with teff, barley, faba bean and chick pea.

In the 2009 cropping season, the Institute for Sustainable Development introduced a system of crop intensification for the Woreda. 21 farmers from five Kebeles volunteered to experiment in their own fields using **wheat, barley, chick pea, lentil** and **faba bean** grown on 2 x 2 m^2 plots. The experiment was also conducted by the development agents in five farmers training centres (FTC).

Farmers counted up to 35 tillers/plant in **wheat** with each spike having 50–60 seeds. Grain yields ranged from 12.5–85 q/ha, with 13 of the 17 farmers getting over 25 q/ha. The rainy season in 2009 was not good for **lentil**. The improved varieties with DAP applied normally give around 18 q/ha. However, *7 farmers experimented with wider spacing and row planting. They observed that the lentil plants had increased numbers of branches/plant and set fruit from the bottom up to the top of each branch*. Yields ranged from 3.75 to 21.25 q/ha with an average of 12.7 q/ha. **Chick pea** sprouted multiple branches with many pods, but frost at the critical seed setting time resulted in most of the pods being empty. One farmer tried row planting of **barley** and obtained an outstanding result of 132.5 q/ha equivalent.