

The agricultural management practice (AMP) of straw return and no tillage, is very commonly applied in the basin of Sichuan. Chengdu plain has a mild climate and abundant rainfall. It belongs to the warm humid subtropical Pacific monsoon climate zone. The main types of soil in the Chengdu plain are paddy soil. Chengdu plain is an important grain production area in Sichuan. Rice field-upland field rotation (rice – wheat or rice - rapeseed) is an important agricultural system. The main technology of this AMP is straw mulching while harvesting and no tillage. Crops are harvested by machine, then straw and stubble were left at size of less than 20 cm on the soil surface, and succession crops such as rape, wheat and potato are seeded directly with no tillage. Both measures aim at better soil regeneration and soil conditions for agriculture and subsequently increased yield and less soil degradation.



Mechanized harvest and straw mulching (rice)



Mechanized harvest and straw mulching (wheat)



Straw mulching and direct seeding under no tillage

The purposes of this AMP are to improve crop production, preserve soil fertility, prevent land degradation and conserve the field ecosystem. Crop yields are increased by 0.3 t ha^{-1} to 0.6 t ha^{-1} compared with not using the AMP. The amount of N is reduced by $45\text{--}60 \text{ kg ha}^{-1}$, both P and K fertilizers are decreased by $30\text{--}45 \text{ kg ha}^{-1}$ in the cropping rotation system. Farmers' income was $1050 \text{ yuan (RMB) ha}^{-1}$. However because the plough layer becomes shallow, it is recommended that the soil is ploughed after an interval of 5 years.



The AMP was applied in the Chengdu plain, Sichuan Province China. This region belongs to a sub-tropical humid monsoon climate with a mean annual temperature of 18.5 °C and rainfall of 927 mm. Agricultural lands comprise 0.15 million hectares, with Calcareous Purplish Soil land accounting for 62%. The main agricultural crops are grain, cotton, oil, fruit, and mulberry. Rice-wheat and rice-rape rotation are the main farming systems in this area. Irrigation water is derived from both the Peijiang River and from rainfall sources. Population density is 813 people per km².

Further details about straw mulching and no tillage

TECHNICAL SPECIFICATION

Crops were harvested by machine and then the straw and stubble was left on the soil surface in pieces of less than 20 cm.

Rice: The N, P and K fertilizers for rice season were applied in form of urea, calcium superphosphate and potassium chloride, or compound fertilizer at the rates of 120-150 kg N ha⁻¹, 45-60 kg P₂O₅ ha⁻¹, and 45-60 kg K₂O ha⁻¹. Rates of 30% of N, 100% of P and 40% of K fertilizers were applied as base fertilizers after transplanting two days, while the remaining 70% of N and 60% of K were used as top dressing fertilizers after transplanting 10 days.

Wheat: The N, P and K fertilizers for wheat season were applied in form of urea, calcium superphosphate and potassium chloride, or compound fertilizer at the rates of 90-120 kg N ha⁻¹, 45-75 kg P₂O₅ ha⁻¹, and 45-60 kg K₂O ha⁻¹. Rates of 30% of N, 100% of P and 50% of K fertilizers were applied as base fertilizers before seeding two days, while the remaining 70% of N and 50% of K were used as top dressing fertilizers.

Rape: The N, P and K fertilizers for rape season were applied in form of urea, calcium superphosphate and potassium chloride, or compound fertilizer at the rates of 105-150 kg N ha⁻¹, 75-105 kg P₂O₅ ha⁻¹, and 75-90 kg K₂O ha⁻¹. Rates of 60% of N, 100% of P and 60% of K fertilizers were applied as base fertilizers before transplanting two days, while the remaining 40% of N and 40% of K were used as top dressing fertilizers at blossom.

MATTERS NEEDING ATTENTION

Heavy metals in the straw did not exceed the standard. Straw decomposition removes nitrogen from the soil, so it is better to apply enough fertilizer, especially N.



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Interactive Soil Quality Assessment

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